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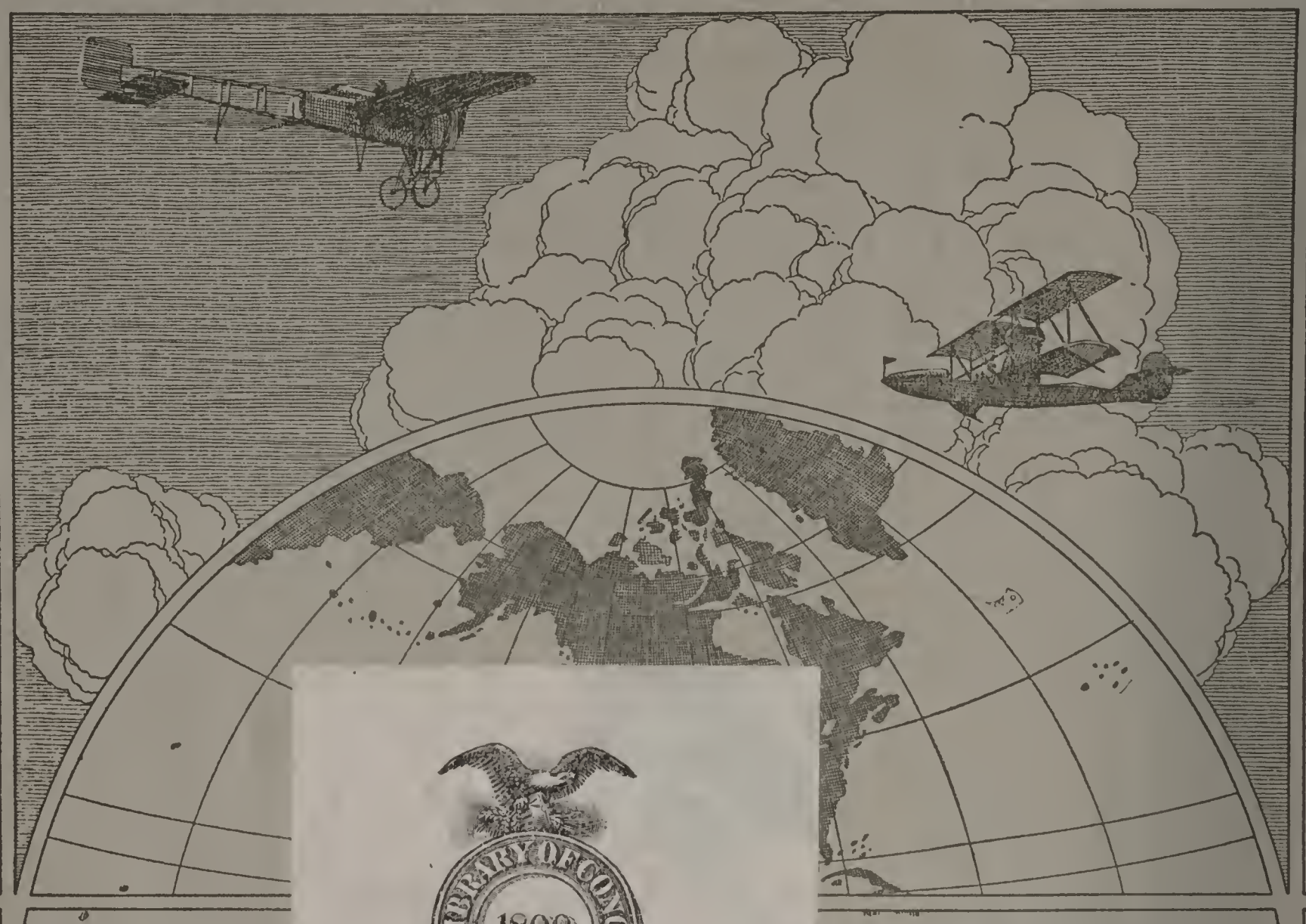

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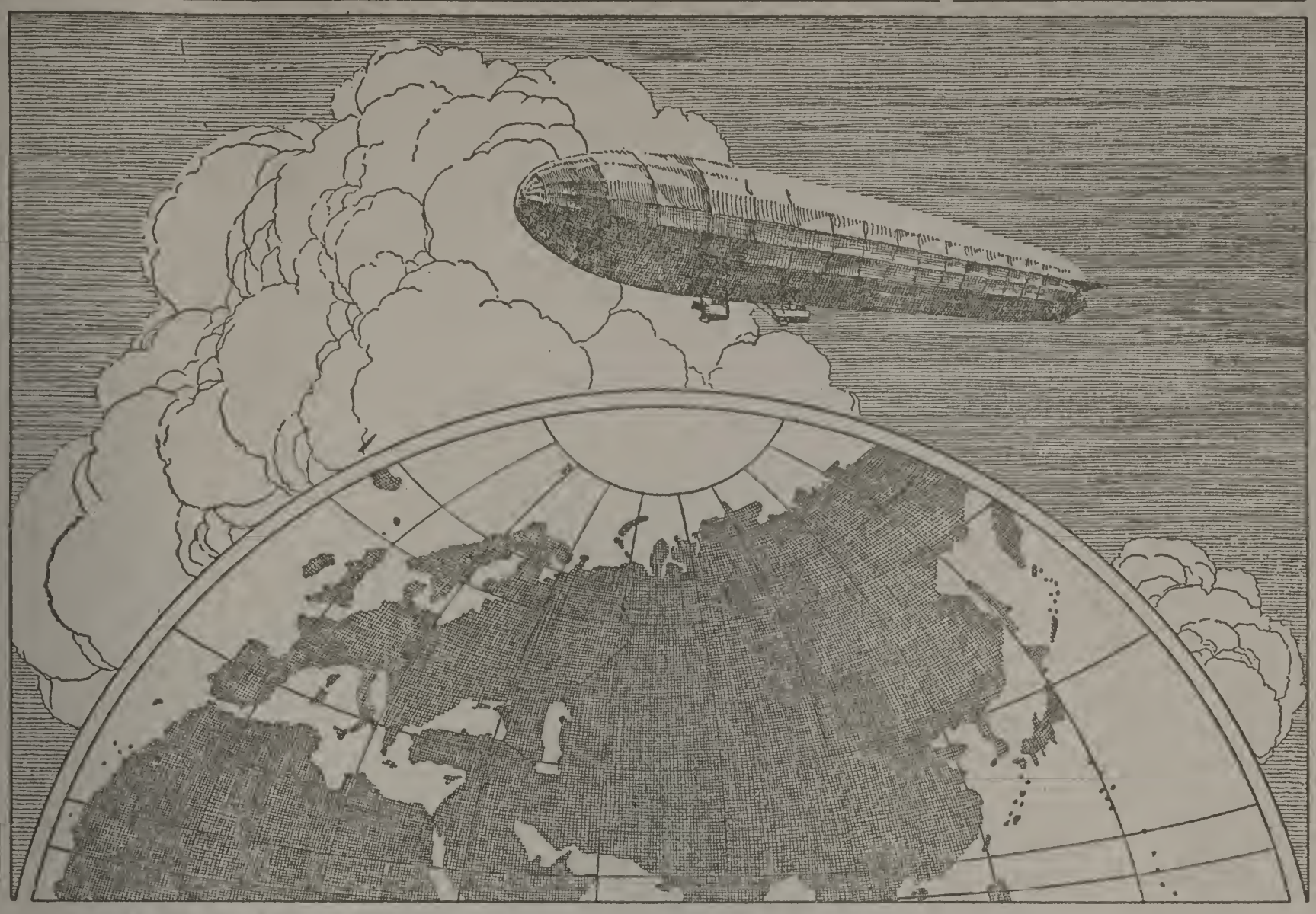

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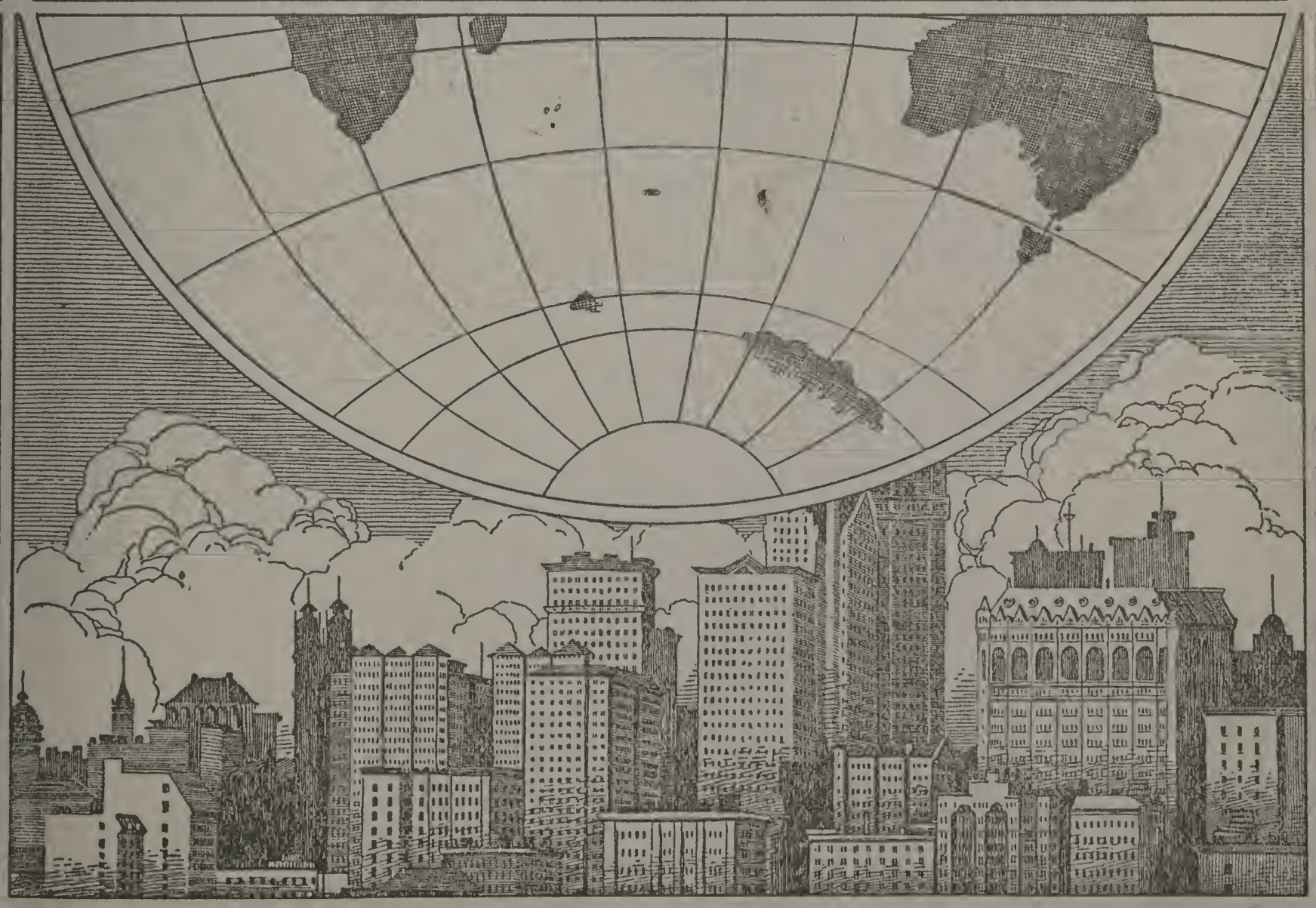

THE WORLD BOOK

ORGANIZED KNOWLEDGE IN STORY AND PICTURE

TRADE MARK REGISTERED

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In Ten Volumes *Volume One*

1923

W. F. QUARRIE & COMPANY

TORONTO CHICAGO NEW YORK

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1923

THE WORLD BOOK

ORGANIZED KNOWLEDGE IN STORY AND PICTURE

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FEB 15 '23

PREFACE

IT IS a large task to select out of the world's knowledge all that is most interesting, illuminating and useful, and present it in an orderly manner so that it can be comprehended, enjoyed and utilized alike by young and old. I feel that this task has been well accomplished in THE WORLD BOOK. My confidence in the value and serviceableness of these volumes steadily increased as the work of preparation progressed. No one could observe without admiration and enthusiasm the building of THE WORLD BOOK, which has required the organization and attractive presentation in story and picture of the important truths in every department of human interest, achievement and investigation. Many minds and hands, and I think I may say many hearts also, have coöperated in the making of these books, and each has done his special work faithfully and enthusiastically, because he has felt the spirit and purpose behind THE WORLD BOOK,— so to present all important knowledge that it will make a strong appeal to every normal person and become a comfort and guide to him in his daily life.

Men and women of these times have the same sort of problems that people had centuries ago. But earlier peoples had to solve their problems largely by trial and error. They did not have access to the wisdom of the past as a guide for the present. People to-day, though, may profit by all the experiences of those who have gone before us, and in THE WORLD BOOK these experiences are described and their outcome portrayed. Particular attention has been given to modern developments in the sciences that deal with human welfare, and with human nature in its physical, mental, social, economic, political, ethical and moral aspects. The stories are told in a simple, straightforward way, the purpose being to make all truth of whatever sort intelligible and attractive.

It is more important to-day than it ever has been to conserve the time and energy of young people in school. Knowledge is accumulating rapidly; there is much more to learn now than there was a few decades ago. Upon teachers and parents rests the responsibility of guiding the young so that they will master all really vital knowledge readily and without waste. In the preparation of THE WORLD BOOK the needs of those who instruct youth have been kept constantly in view. Every subject of instruction in the elementary and high schools is discussed herein. The story of each branch is presented in the proper place, and it is shown how it has been developed, what rôle it plays in human life, what its value in modern education is, and how each topic can best be presented so as to enlist the interest of the learner, and so that it will remain with him and be assimilated into his thought and conduct.

For the benefit of parents, teachers, and all who would keep in touch with the development of education there are articles on many special subjects, such as the measurement of the intelligence of children, the use of standards and scales in determining progress in educational work, the use of museums as an aid in making teaching concrete, the development of coöperative work among teachers and parents, the extension of the principles of the Montessori system to general education, the principles underlying the Gary educational system, and so on.

As a rule encyclopedias are apt to be quite formal and technical. A faithful effort has been made in THE WORLD BOOK to avoid this common defect. Every-day, simple language is used, and technical terms are employed very sparingly. Whenever they

are utilized, the context and illustrations will enable the reader readily to comprehend them. All articles have been scrutinized by the editors for the purpose of securing clearness. Every writer has had it impressed upon him that each sentence should be so constructed that the reader will not have to go over any part of it a second time in order to grasp its meaning.

It was decided when the plans were being prepared for THE WORLD BOOK that it should be abundantly and effectively illustrated. This decision has been carried out fully. Over five thousand pictures appear in these volumes. Topics in any department which could not well be illustrated by photographs are made clear by diagrams and sketches which show all significant facts of structure, function and relation. Pictures illustrating historical events are given in plenty. Animal and plant life are richly illustrated with photographs and designs showing structure, function, and adaptation to environment. Every geographical topic is made concrete by the use of maps and photographic illustrations of physiographic and political conditions. Ancient and modern architecture is pictured so that the reader can hardly fail to get the essential characteristics of any style, and there are reproductions of renowned works of art. All pictures, maps, reproductions, and illustrations of every kind were made especially for THE WORLD BOOK by artists working in connection with the editors.

It is essential, of course, that every topic in an encyclopedia should be treated accurately and authoritatively. In order to insure accuracy as well as timeliness in this work, the editors were assisted by a large staff of specialists in every department of learning and achievement. All important articles have been contributed or reviewed by these authorities. No topic has been allowed to escape careful scrutiny, to the end that no error of fact might be permitted to enter into this work.

In order to assist the reader, all long articles have been presented under subheads. The chief points in each of these articles can thus be quickly grasped. In many of the articles an outline of points is presented for the guidance of the teacher, the parent and the pupil, and review and original questions are given upon the contents of these articles. Extensive use has been made of cross references and lists of related topics, so that the reader in the study of any subject can quickly turn to all the articles that relate in any way to it. Generous use has been made also of departmental and general indexes which will enable the reader to locate any subject in which he is interested without loss of time or energy. The correct pronunciation of all unusual or difficult terms is given.

Special mention should be made of the exceptionally valuable services of the editor, Mr. Ellsworth D. Foster. The completion of THE WORLD BOOK would have been impossible without his varied and extensive knowledge, his organizing skill and his devotion.

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Cobb, R. G., Secretary, Chamber of Commerce and Business League, Mobile, Alabama.
Cole, Heath K., Secretary, Chamber of Commerce, Tiffin, Ohio.
Collier, Paul S., Secretary, Chamber of Commerce, Oneonta, New York.
Collins, D. J., Mayor, Grand Falls, New Brunswick.
Collins, Walter L., Secretary, Board of Trade, Milford, Massachusetts.
Commerford, A. B., Secretary, Board of Trade, Newport, Rhode Island.
Conant, G. O., Mayor, Oshawa, Ontario.
Conkling, Lawrence S., Secretary, Chamber of Commerce, Middletown, New Jersey.
Conkling, Wm. H., Secretary, Commercial Club, Springfield, Illinois.
Cooney, John E., Secretary, Business Men's Association, Cohoes, New York.
Cornell, H. A., Jr., Secretary, Chamber of Commerce, Ossining, New York.
Cox, George H., Secretary, Chamber of Commerce, Owensboro, Kentucky.
Coyne, C. E., Secretary, Chamber of Commerce, Holyoke, Massachusetts.
Crawford, D. J., Secretary, Business Men's Association, Homestead, Pennsylvania.
Cross, H. M., Secretary, Commercial Club, Superior, Wisconsin.
Crowley, W. M., Town Clerk, Oakville, Ontario.
Cull, Geo. F., Secretary, Commercial Club, Appleton, Wisconsin.
Cummings, M. W., Superintendent of Schools, Olyphant, Pennsylvania.
Curry, Chas. M., Secretary, Board of Trade, Camden, New Jersey.
Curtis, J. Clare, Secretary, Chamber of Commerce, Berlin, New Hampshire.
Davidson, G. S., Mayor, Indian Head, Saskatchewan.
Dennison, O. F., Assessor, Transcona, Manitoba.
D'Evelyn, Norman F., Publicity Manager, Chamber of Commerce, Stockton, California.
Devenny, J. A., Town Clerk and Treasurer, Renfrew, Ontario.
Dickie, L. P., Secretary, Board of Trade, Tampa, Florida.
Dill, W. B., Secretary, Chamber of Commerce, Atlantic City, New Jersey.
Dinsley, T. A., Town Clerk, Wilkie, Saskatchewan.
Dittemore, C. L., Secretary, Chamber of Commerce, Coeur d'Alene, Idaho.
Doherty, Thomas, Mayor, Sarnia, Ontario.
Dolbeare, Harris M., Secretary, Merchants and Business Men's Association, Wakefield, Massachusetts.
Donlon, Wm. J., Secretary, Chamber of Commerce, Worcester, Massachusetts.
Doremus, R. H., Secretary, Business Men's Association, East Orange, New Jersey.
Douglass, James D., Secretary, Commercial Club, Logansport, Indiana.
Drury, Wells, Secretary, Chamber of Commerce, Berkeley, California.
Duncan, E. A., Cobourg, Ontario.
Duncan, L. G., Secretary, Business Men's Association, Bowling Green, Kentucky.
Duncan, W. A., City Clerk, New Westminster, British Columbia.
Duncar, P. C., Mayor, Estevan, Saskatchewan.
Dysard, H. R., Secretary, Board of Trade, Ashland, Kentucky.
Eckel, Frank E., Secretary, Commercial Association, Boulder, Colorado.
Elliott, Cyrus M., Secretary, Business Men's Association, Lockhaven, Pennsylvania.
Elsworth, R. H., Secretary, Chamber of Commerce, Traverse City, Michigan.
Emington, T. G., Secretary, Commercial Association, Streator, Illinois.
Ennis, H. D., Secretary, Commercial Club, Saint Joseph, Missouri.
Ersland, Arthur, Secretary, Merchants Association, Chickasha, Oklahoma.
Evans, S. R., Secretary, Chamber of Commerce, Mattoon, Illinois.
Fallen, A. J., Secretary, Board of Trade, Martins Ferry, Ohio.
Farrally, J. F., Secretary, Improvement Association, Bristol, Rhode Island.
Farris, Edward N., Secretary, Commercial Club, Corpus Christi, Texas.
Felt, A. T., Secretary, Chamber of Commerce, Alexandria, Louisiana.
Ferrel, R. W., Secretary, Chamber of Commerce, Wilkes-Barre, Pennsylvania.
Fisher, Jas. T., Cashier, State Savings Bank, Laurium, Michigan.
Fitzgerald, H. B., Secretary, Chamber of Commerce, Anderson, South Carolina.
Fitzgerald, J. M., Secretary, Chamber of Commerce, Paterson, New Jersey.
Fletcher, Robt. S., Jr., Secretary, Merchants and Manufacturers Association, Jackson, Tennessee.
Foley, R. A., Secretary, Business Men's Association, Cortland, New York.
Foreman, W. M., Chatham, Ontario.
Foster, George W., Town Clerk, Orange, New Jersey.
Fouts, J. E., Secretary, Business Men's Association, Muncie, Indiana.
Fowler, J. A., Chatham, New Brunswick.
Frank, W. H., Poughkeepsie, New York.
Freeman, Harry H., Secretary, Chamber of Commerce, Hazleton, Pennsylvania.
Fuller, A. E., Danvers, Massachusetts.
Fulton, Jas. M., Secretary, Industrial Association, Keokuk, Iowa.
Gabig, A. J., Secretary, Board of Trade, Carnegie, Pennsylvania.
Gage, Frank L., Marlborough, Massachusetts.
Gareau, M., Town Clerk, Hawkesbury, Ontario.
Garvey, J. M., Secretary, Commercial Association, Iron Mountain, Michigan.
Gayle, D. G., Secretary, Chamber of Commerce, Coshocton, Ohio.
Gibb, F. D., President, Chamber of Commerce, Monroe, Louisiana.
Gibbs, Leroy M., Secretary, Commercial Club, Sioux Falls, South Dakota.
Gidney, C. M., Secretary, Commercial Club, Santa Barbara, California.
Gilcreast, W. L. S., Secretary, Real Estate Owners Association, Methuen, Massachusetts.
Givens, Frank M., Secretary, Business Men's Association, Fond du Lac, Wisconsin.
Glover, R. O., Secretary, Chamber of Commerce, Mount Vernon, New York.
Goffrey, John, Secretary, Young Men's Business League, Palestine, Texas.
Goldsborough, A. S., Managing Editor, Municipal Journal, Baltimore, Maryland.
Goll, Oscar K., Secretary, Commercial Club, Douglas, Arizona.
Gorton, Chauncey B., Secretary, Board of Trade, Medford, Massachusetts.
Graham, Dugald, Mayor, Strathroy, Ontario.
Grant, Ray A., Secretary, Business Men's League, Salem, Oregon.
Graves, C. W., Secretary, Commercial Club, Grand Forks, North Dakota.
Gray, Jos. H., Secretary, Commercial Club, Bisbee, Arizona.
Gray, P. A., Secretary, Commercial Club, Pueblo, Colorado.
Gray, Walles S., Secretary, Board of Trade, Irvington, New Jersey.

Greer, C. R., Secretary, Chamber of Commerce, Hamilton, Ohio.
Grieve, W. R., City Clerk, Portage la Prairie, Manitoba.
Grimmer, F. Parker, Mayor, Saint Stephen, New Brunswick.
Gruber, Eugene F., President, Business Men's Association, Mahanoy City, Pennsylvania.
Guay, P. E., Secretary and Treasurer, Black Lake, Quebec.
Haeder, J. A., Secretary, Commercial Club, North Yakima, Washington.
Hafey, James E., Secretary, Board of Trade, Chicopee, Massachusetts.
Haines, H. H., Secretary and Traffic Manager, Commercial Association, Galveston, Texas.
Hakes, C. C., Assistant Secretary, Commercial Club, Davenport, Iowa.
Hale, Fletcher, President, Lake City Business Men's Club, Laconia, New Hampshire.
Hall, John O., Secretary, Board of Trade, Quincy, Massachusetts.
Hall, Thos., Secretary, Chamber of Commerce, Ashtabula, Ohio.
Hamilton, John J., Secretary, Commercial Club, Fort Madison, Iowa.
Hammersmith, A., Secretary, Chamber of Commerce, Massillon, Ohio.
Hampton, R., Secretary, Chamber of Commerce, Dallas, Texas.
Hanes, C. O., Secretary, Commercial Club, Columbia, Missouri.
Hardison, F. K., Secretary, Chamber of Commerce, Geneva, New York.
Hardy, J. P., Secretary, Commercial Club, Fargo, North Dakota.
Hargan, W. F., Secretary, Commercial Association, Boone, Iowa.
Harris, Emory S., Secretary, Board of Trade, Bennington, Vermont.
Harrison, F. W., Secretary, Business Men's Association, Anaconda, Montana.
Harsolais, A. L., Secretary-Treasurer, Joliette, Quebec.
Harvey, Paul L., Secretary, Chamber of Commerce, Youngstown, Ohio.
Hatcher, H. R., Walkerville, Ontario.
Hay, Thomas A. H., Secretary, Board of Trade, Easton, Pennsylvania.
Hays, T. W., President, Business Men's Association, Huntington, West Virginia.
Hazlett, Fred R., President, Galesburg Club, Galesburg, Illinois.
Heal, W. F., City Commissioner, Moose Jaw, Saskatchewan.
Hebbe, C. R., Manager, Chamber of Commerce, Cincinnati, Ohio.
Heidler, C. D., Athens, Georgia.
Heinpel, Carl A., Secretary, Board of Trade, North Attleboro, Massachusetts.
Henderson, A. W., Secretary, Chamber of Commerce, Colorado Springs, Colorado.
Henderson, Leland J., Secretary, Chamber of Commerce, Columbus, Georgia.
Hildebrandt, O. F., Secretary, Greater Moline Committee, Moline, Illinois.
Hogan, Lewis R., Secretary, Municipal League, Millville, New Jersey.
Holcrombe, R. W., Secretary, Chamber of Commerce, Columbia, South Carolina.
Holbein, Will E., Secretary, Builders and Traders Exchange, Minot, North Dakota.
Hollenga, D. S., Secretary, Chamber of Commerce, Fulton, New York.
Holmes, W. E., Secretary, Commercial Club, Sioux City, Iowa.
Horne, G. K., Secretary, Chamber of Commerce, Rocky Mount, North Carolina.
Hovey, Merlin R., Secretary, Commercial Boosters Club, Logan, Utah.
Howe, D. F., Secretary, Chamber of Commerce, Utica, New York.
Howe, H. M., Secretary, Chamber of Commerce, Alpena, Michigan.
Howe, J. Ed., Secretary, Chamber of Commerce, Shreveport, Louisiana.
Huber, Roy, Newspaper Correspondent and Advertising Writer, Norristown, Pennsylvania.
Hudson, J. H., Secretary, Commercial Club, Bloomington, Illinois.
Hulett, A. A., Secretary, Commercial Club, Well City, Missouri.
Hume, T. M., Secretary, Commercial Exchange, Burlington, Iowa.
Humphrey, John, Secretary, Chamber of Commerce, New London, Connecticut.
Huntress, C. B., Secretary, Chamber of Commerce, Marion, Ohio.
Hurlbut, Clayton E., Mayor, Preston, Ontario.
Hyman, E. H., Secretary, Chamber of Commerce, Americus, Georgia.
James, Edgar, Secretary, Commercial Club, Florence, Alabama.
Jarvis, Sturgis C., Secretary, Board of Trade, Brookline, Massachusetts.
Jeffrey, Frank M., Secretary, Chamber of Commerce, Torrington, Connecticut.
Jewett, E. C., Secretary, Chamber of Commerce, Brockton, Massachusetts.
Johnson, B. Frank, Secretary, Chamber of Commerce, Wichita Falls, Texas.
Johnson, Harry G., Secretary, Board of Trade, Malden, Massachusetts.
Johnson, Harvey, Assistant Secretary, Chamber of Commerce, Atlanta, Georgia.
Johnson, J. K., Acting Secretary, Chamber of Commerce, Johnstown, Pennsylvania.
Johnson, V. R., Secretary, Commercial Club, Beatrice, Nebraska.
Johnson, W. H. C., Secretary, Chamber of Commerce, Macon, Georgia.
Johnston, C. R., Secretary, Chamber of Commerce, Marinette, Wisconsin.
Jones, P. G., Assistant Secretary, Chamber of Commerce, San Diego, California.
Kaiser, Richard F., Secretary, Civic and Commerce Association, Eau Claire, Wisconsin.
Keene, Geo. W., Director of Industrial Affairs, Niagara Falls, New York.
Kelleher, Geo. H., Secretary and Treasurer, Greenfield, Massachusetts.
Kelley, J. Will, Secretary, Commercial Club, Topeka, Kansas.
Kellim, C. J., Secretary, Civic Club, Kewanee, Illinois.
Kelly, L. W., Secretary, Commercial Club, Moberly, Missouri.
Kennedy, B., General Secretary, Chamber of Commerce, Montgomery, Alabama.
Kennedy, J. C., Secretary, Board of Trade, Prince Albert, Saskatchewan.
Kennedy, Jno. J., Secretary, Board of Trade, Northampton, Massachusetts.
Kerr, J. A., Town Clerk, Perth, Ontario.
Kerwin, Robert E., President, Board of Trade, Framingham, Massachusetts.
Kestler, G. E., Concord, North Carolina.
Ketchum, Chas. M., General Manager, Commercial Association, Wheeling, West Virginia.
Ketchum, Chas. M., Managing Secretary, Washington Board of Trade, Washington, Pennsylvania.
Ketey, L. A., Secretary, Board of Trade, Montpelier, Vermont.
Kiddie, S. T., Jr., Secretary, Chamber of Commerce, Saint Augustine, Florida.
King, H. C., Assistant Secretary-Treasurer, Sherbrooke, Quebec.
King, W. M., Secretary, Chamber of Commerce, Denison, Texas.
Kiser, M. C., Manager, Business People's Protective Bureau, Anniston, Alabama.
Knapp, H. R., Secretary, Merchants Association, Pottsville, Pennsylvania.
Knight, Geo. A., Mayor, Brockville, Ontario.
Knowlton, Henry, Secretary, Board of Trade, Cadillac, Michigan.
Kock, H. I., Secretary, Chamber of Commerce, Allentown, Pennsylvania.
Koenemann, A. D., Secretary, Board of Trade, Gloucester City, New Jersey.
Krake, H. G., Secretary, Chamber of Commerce, Benton Harbor, Michigan.
Krueger, E. H., Secretary, Elgin Commercial Club, Elgin, Illinois.

Kunmel, Harry J., Secretary, Merchants Association, Mount Carmel, Pennsylvania.
Lacey, Jno. B., Secretary, Chamber of Commerce, Newport News, Virginia.
Lakin, Egerton S., Secretary, Chamber of Commerce, Palo Alto, California.
Lamont, R. M., Secretary, Industrial Club, Cheyenne, Wyoming.
Landsberg, Theodore, Manager, Commercial Club, Erie, Pennsylvania.
Larson, J. Baird, Secretary, Publicity Bureau, Weber Club, Ogden, Utah.
Latta, H. A., Secretary, Commercial Club, Medford, Oregon.
Laughlin, J. H. M., Secretary, Commercial Club, Monmouth, Illinois.
Lawler, J. E., Secretary, Commercial Club, Hibbing, Minnesota.
Lawson, F. H., Secretary, Chamber of Commerce, Watertown, New York.
Lee, W. G., Secretary to the City Manager, Dayton, Ohio.
Lefebvre, J. E., Secretary-Treasurer, Farnham, Quebec.
Lehman, L. J., Secretary, Chamber of Commerce, Columbus, Indiana.
Leidy, Paul A., Jackson, Michigan.
Leopold, Jos. F., Secretary, Chamber of Commerce, Frankfort, Kentucky.
Leur, H. C., Secretary, Board of Trade, Arlington, Massachusetts.
Lewis, G. W., Secretary, Chamber of Commerce, Oil City, Pennsylvania.
Libbey, MacLean, Secretary, Chamber of Commerce, McKeesport, Pennsylvania.
Linabury, E. B., Secretary, Board of Commerce, Flint, Michigan.
Linsley, Frank J., Secretary, Business Men's Association, New Haven, Connecticut.
Lippé, D. L., Town Clerk, Megantic, Quebec.
Little, Dr. Geo., Secretary, Board of Trade, Tuscaloosa, Alabama.
Little, R. D., Mayor, Owen Sound, Ontario.
Littlejohn, W. A., City Clerk, Toronto, Ontario.
Lochner, Walter O., Secretary, Commercial Club, Wabash, Indiana.
Lockwood, James T., Town Clerk, Warwick, Rhode Island.
Long, W. E., Secretary, Chamber of Commerce, Austin, Texas.
Lovelace, D. D., Secretary, Chamber of Commerce, Danbury, Connecticut.
Ludlow, J. L., Winston-Salem, North Carolina.
McCarthy, Geo. D., Assistant Secretary, Commercial Club, Duluth, Minnesota.
McCartney, Joseph, Galt, Ontario.
McCarty, E. C., Secretary, Chamber of Commerce, East Chicago, Indiana.
McCrea, C. W., City Treasurer, Sault Sainte Marie, Ontario.
McCrery, J. F., Secretary, Commercial Club, Greeley, Colorado.
McDougall. Horace, Town Clerk, Truro, Nova Scotia.
McInnis, A. H., Secretary, Board of Trade, Key West, Florida.
McKinley, Eugene F., Secretary, Business and Professional Men's Association, White Plains; New York.
McNaughton, Alexander, City Clerk, Fort William, Ontario.
McPeck, Edwin K., Secretary, Business Men's Association, Adams, Massachusetts.
McQuarrie, H. A., Mayor, Westville, Nova Scotia.
Macdonald, N. G., Mayor, Antigonish, Nova Scotia.
Magee, J. S., City Clerk, Moncton, New Brunswick.
Malherbe, A., Aylmer, Quebec.
Mann, W. J., Mayor, Aylmer West, Ontario.
Manning, C., Mayor, Verdun, Quebec.
Marks, H. L., Secretary, Business Men's League, Carthage, Missouri.
Marr, C. H., Mayor, Wyandotte, Michigan.
Marsh, H. M., Commissioner of Industries, Hamilton, Ontario.
Martigny, Camille-L. de, Saint Jerome, Quebec.
Martin, Donald K., Manager, Chamber of Commerce, Columbus, Ohio.
Martin, Eugene L., Secretary, Chamber of Commerce, Bristol, Pennsylvania.
Martin, F. J., Secretary, Chamber of Commerce, Cape Girardeau, Missouri.
Martin, M. W., Secretary, Business Men's League, Helena, Arkansas.
Mattison, R. H., Secretary, Chamber of Commerce, Seattle, Washington.
Mead, W. L., Secretary, Chamber of Commerce, Hartford, Connecticut.
Meller, Frank J., Secretary, Commercial Club, Galena, Illinois.
Melville, A. H., Secretary, Board of Commerce, Madison, Wisconsin.
Memolo, Martin, Chief Burgess, Old Forge, Pennsylvania.
Merrill, John F., Secretary, Commercial Club, Red Wing, Minnesota.
Messick, E. L., Secretary, Merchants Protective Association, Pittston, Pennsylvania.
Metzgar, J. C., Secretary, Chamber of Commerce, Santa Ana, California.
Milks, Geo. R., Secretary, Chamber of Commerce, Lackawanna, New York.
Milligan, Will L., Secretary, Commercial Club, Bellaire, Ohio.
Milne, F. F., City Clerk, Port Arthur, Ontario.
Mitchell, Fred J., Mayor, Dominion, Nova Scotia.
M'Lean, Chas., Chairman on Statistics, Commercial Club, Dubuque, Iowa.
Mock, John H., Secretary, Chamber of Commerce, Albany, Georgia.
Moodie, Thos. H., Secretary, Commercial Club, Virginia, Minnesota.
Moore, Dr. Charles P., Mayor, Weyburn, Saskatchewan.
Moore, Harold, Secretary, Board of Trade, Newton, Massachusetts.
Moore, Robert, Mayor, Fort Frances, Ontario.
Morgan, F. E., Secretary, Business Men's Association, Bridgeport, Connecticut.
Morgans, T. J., Commercial Secretary, Mitchell, South Dakota.
Morin, René, Mayor, Saint Hyacinthe, Quebec.
Morrison, A. M., Coleman, Alberta.
Morrison, John, City Clerk, Woodstock, Ontario.
Morrow, W. E., Secretary, Board of Trade, Louisville, Kentucky.
Morse, O. S., Secretary, Commercial Club, Janesville, Wisconsin.
Mowry, H. W., Secretary, Business Men's Association, Providence, Rhode Island.
Moxley, Harry L., Jr., Secretary, Business Men's Association, Montclair, New Jersey.
Murphy, C. W., Secretary, Chamber of Commerce, Champaign, Illinois.
Murphy, John H., Secretary, Board of Trade, Lowell, Massachusetts.
Murray, Thomas, Town Clerk, Sackville, New Brunswick.
Neal, G. C., Assistant Secretary, Chamber of Commerce, Terre Haute, Indiana.
Nelson, E. A., Secretary, Booster Club, Ludington, Michigan.
Nelson, O. H., Alderman, Prince Rupert, British Columbia.
Newbold, Chas., Secretary, Chamber of Commerce, Lancaster, Pennsylvania.
Newcomb, Bryant B., Mayor, Long Branch, New Jersey.
Newman, Frederick, Mayor, Picton, Ontario.
Nice, G. S., Secretary, Chamber of Commerce, Plattsburg, New York.
Nichols, D. W., Secretary, Chamber of Commerce, Bristol, Connecticut.
Noble, A. E., Secretary, Young Men's Business League, Temple, Texas.
Norris, W. C., Secretary, Business Men's Association, Willimantic, Connecticut.
Norwood, A., Secretary, Merchants Association, and President, Board of Trade, Saint Petersburg, Florida.
Nuttalt, Henry, Secretary, Commercial Club, Provo City, Utah.
O'Brion, Fulton, Secretary, Board of Trade, Somerville, Massachusetts.

O'Connor, F. C., Secretary and Treasurer, Merchants Association, North Adams, Massachusetts.
O'Connor, Fergus J., M. D., Mayor, Gananoque, Ontario.
Osgood, E. G., Secretary, Chamber of Commerce, Clinton, Massachusetts.
Owen, Thos. F., Secretary, Board of City Developments, San Angelo, Texas.
Paden, A. R. G., Carleton Place, Ontario.
Palmer, C. D., Secretary, Commercial Club, Elwood, Indiana.
Partridge, F. A., Secretary, Business Men's Association, Mishawaka, Indiana.
Peffers, Jno. M., Secretary, Chamber of Commerce, Aurora, Illinois.
Perry, C. F., Secretary, Chamber of Commerce, Quincy, Illinois.
Phelps, H. A., Secretary, Board of Trade, Barre, Vermont.
Philip, Gordon, Secretary, Board of Trade, London, Ontario.
Phillips, F. R. S., Secretary, Boosters Club, Tallahassee, Florida.
Pittard, W. W., Mayor, Almonte, Ontario.
Porter, H. R., Secretary, Chamber of Commerce, Vancouver, Washington.
Powell, Arthur A., Secretary, Commercial Club, Devils Lake, North Dakota.
Pratt, N. F., Editor, Weymouth Gazette, Weymouth, Massachusetts.
Price, G. L., Secretary, Commercial Club, Bismarck, North Dakota.
Puffer, S. P., Secretary, Chamber of Commerce, Charleston, West Virginia.
Pullen, G. H., Municipal Clerk, Esquimalt, British Columbia.
Purintor, John A., Morgantown, West Virginia.
Purling, David, Chelsea, Massachusetts.
Purse, Thomas, Secretary, Board of Trade, Savannah, Georgia.
Ragsdale, French, Secretary, Chamber of Commerce ,Frankfort, Indiana.
Ranson, W. J., Prescott, Ontario.
Raphun, C. W., Director of Publicity, Springfield, Missouri.
Rattray, Alexander L., City Clerk, Nanaimo, British Columbia.
Raymond, Horace W., Schenectady, New York.
Rayson, W. A., Secretary, Retail Merchants Association, Tulsa, Oklahoma.
Reade, John L., Secretary, Chamber of Commerce, Lewiston, Maine.
Redmond, W. J., Mayor, Maple Creek, Saskatchewan.
Reed, W. H., Secretary, Commercial Club, Racine, Wisconsin.
Reeder, K. A., Rosthern, Saskatchewan.
Reid, Jno. T., Campbellton, New Brunswick.
Re Mine, N. B., Secretary, Board of Trade, Bristol, Tennessee.
Renitges, J. C., Secretary, Commercial Club, Granite City, Illinois.
Rheem, L. M., Secretary, Commercial Club, Helena, Montana.
Rhoades, Jas. M., Secretary, Chamber of Commerce, Bozeman, Montana.
Richards, John W., Secretary, Business Men's Association, Hopkinsville, Kentucky.
Richards, Morgan, Secretary, Chamber of Commerce, Selma, Alabama.
Rittenberg, Sidney S., Publicity Secretary, Chamber of Commerce, Charleston, South Carolina.
Rix, Geo. E., Secretary, Chamber of Commerce, Lawrence, Massachusetts.
Roberts, N., Acting Mayor, Argenta, Arkansas.
Roberts, O. T., Secretary, Commercial Club, Clinton, Iowa.
Robertson, Wm. F., Secretary, Chamber of Commerce, Greenville, South Carolina.
Robinson, Harry A., Secretary, Commercial Association, Yankton, South Dakota.
Rochelle, Z. A., City Auditor, Durham, North Carolina.
Rodgers, D. H., Secretary, Business Men's Association, Martinsburg, West Virginia.
Rodgers, H. Jay, Secretary, Chamber of Commerce, Jacksonville, Illinois.
Rogers, L. S., Secretary, Merchants Association, Gloversville, New York.
Rogerson, James, Secretary, Business Men's Association, Easthampton, Massachusetts.
Roof, H. H., Secretary, Commercial Club, Biloxi, Mississippi.
Ropes, Wm., New Rochelle Association, New Rochelle, New York.
Ross, W. J., Town Clerk, Sudbury, Ontario.
Roy, James, Town Clerk, New Glasgow, Nova Scotia.
Rowe, Ernest H., Secretary, Chamber of Commerce, Jersey City, New Jersey.
Rowe, N. R., Assistant Industrial Commissioner, Commercial Club, Kansas City, Missouri.
Russell, H. A., Assistant Secretary, Chamber of Commerce, Fort Scott, Kansas.
Ruttan, G. F., Mayor, Napanee, Ontario.
Salo, L. S., Copper Country Commercial Club, Hancock, Michigan.
Sampson, E. T., City Clerk, Outremont, Quebec.
Saunders, J. D., Camrose, Alberta.
Saunders, Winona M., Secretary, Civic Association, Ann Arbor, Michigan.
Sawin, L. P., Secretary, Board of Trade, Everett, Massachusetts.
Saxton, F. J., Corning, New York.
Scarff, Will H.. Secretary, Chamber of Commerce, Enid, Oklahoma.
Schenck, W. P., Secretary, Business Men's Association, Connellsville, Pennsylvania.
Schnorbach, P. P., Secretary, Chamber of Commerce, Muskegon, Michigan.
Searing, E. F., Secretary, Commercial Club, Mankato, Minnesota.
Seberger, P. J., Mayor, Saint Cloud, Minnesota.
Seegmiller, W. A., Secretary, Improvement Association, Owosso, Michigan.
Sengel, Geo., Secretary, Business Men's Club, Fort Smith, Arkansas.
Senton, F. S., Secretary, Commercial Club, Laurel, Mississippi.
Sexaner, C. H., Secretary, Chamber of Commerce, Lancaster, Ohio.
Seybalt, E., Clerk, Board of Education, Portsmouth, New Hampshire.
Seymour, W. J., City Clerk, Niagara Falls, Ontario.
Shaefer, H. F., Secretary and Treasurer, Industrial Association, Ypsilanti, Michigan.
Shaffer, V. N., President, Chamber of Commerce, Phoenixville, Pennsylvania.
Shepherd, R. M., Secretary, Business Men's Association, Carbondale, Pennsylvania.
Sherrin, Dr. W. A., Mayor, Souris, Manitoba.
Shinaberger, J. L., Secretary, Commercial Club, McAlester, Oklahoma.
Shipper, J., Assistant Secretary, Chamber of Commerce, Miami, Florida.
Silverton, G. E., Copper Cliff, Ontario.
Simonds, R. H., Publicity Commissioner, Board of Trade, Fredericton, New Brunswick.
Sipfle, Phil. H., Secretary, Association of Commerce, Pekin, Illinois.
Smith, A. M., Secretary, Board of Trade, Brunswick, Georgia.
Smith, A. R., Secretary, Commercial Club, McKees Rocks, Pennsylvania.
Smith, C. W., Secretary, Chamber of Commerce, Conneaut, Ohio.
Smith, Giles, Assistant Secretary, Commercial Club, Tacoma, Washington.
Smith, Kirby, Secretary, Commercial Club, Mount Vernon, Illinois.
Smith, Louis S., President, Business Men's Association, Beverly, Massachusetts.
Smith, M. C., Mayor, Burlington, Ontario.
Soots, Orpheus C., Secretary, Commercial Club, Walla Walla, Washington.
Smith, Rene W., Auburn, Maine.
Sparkes, Grace M., Secretary, Chamber of Commerce, Prescott, Arizona.
Spencer, H. E., President, Merchants Association, Dunmore, Pennsylvania.
Spicer, W., Mayor, Parrsboro, Nova Scotia.
Steven, R., Mayor, Petrolea, Ontario.
Stevens, Vincent S., Secretary, Chamber of Commerce, Akron, Ohio.

Stevenson, C. T., Reno, Nevada.
Stevenson, G. H., Secretary, Board of Trade, Bessemer, Alabama.
Stewart, E., Superintendent, Rocky Mountains Park, Banff, Alberta.
Stuttle, Luther A., Secretary, Business Men's Association, Hattiesburg, Mississippi.
Sullivan, V. T., Secretary, Chamber of Commerce, Salem, Massachusetts.
Sumner, Chas. G., Editor, Tribune, Pocatello, Idaho.
Sumner, W. K., Secretary, Chamber of Commerce, Glens Falls, New York.
Summers, Nora E., Secretary, Merchants Retail Association, Santa Fe, New Mexico.
Talbot, E., City Clerk, Fraserville, Quebec.
Tallmadge, H. C., Assistant Secretary, Civic and Commercial Association, Denver, Colorado.
Taylor, Fred W., Secretary, Business Men's Association, Lebanon, Pennsylvania.
Taylor, H. E., Business Manager, Association of Commerce, Marion, Indiana.
Thayer, W. W., Concord, New Hampshire.
Thomas, Geo. H. O., Mayor, Bracebridge, Ontario.
Thomas, R. E., Secretary, Business Men's Association, Portsmouth, Ohio.
Thompson, Robert W., Secretary, Commercial Association, La Salle, Illinois.
Thompson, Troy, Secretary, Business Men's Association, Amarillo, Texas.
Thomson, P. B., Town Clerk, Arcola, Saskatchewan.
Thomson, W. D., Secretary, Commercial Club, Delaware, Ohio.
Thorpe, Elmer C., Secretary, Commercial Club, Lead, South Dakota.
Toly, Clarence, Assistant Secretary, Civic and Commercial Association, Minneapolis, Minnesota.
Tomkins, J. A., Granby, Quebec.
Tousley, W. E., Industrial Commissioner, Chamber of Commerce, Cleveland, Ohio.
Towne, O. B., Secretary, Chamber of Commerce, Kalamazoo, Michigan.
True, Geo. C., Oskaloosa, Iowa.
Turley, G. T., Town Clerk, Minnedosa, Manitoba.
Tuther, Jno. M., Secretary, Business Men's Club, Chamber of Commerce, Memphis, Tennessee.
Ullman, Carl W., Secretary, Chamber of Commerce, Salem, Ohio.
Ullrick, C. W., Secretary, Board of Trade, Englewood, New Jersey.
Vallely, Chas. E., President, Business Men's Association, Sanford, Maine.
Van Auken, C. S., Secretary, Board of Trade, La Crosse, Wisconsin.
Vanderburgh, W. F., Secretary, Association of Commerce, Cairo, Illinois.
Vanderlieth, E. D., Secretary, Business Men's Association, Carson City, Nevada.
Vannier, Ls. Rod., Town Clerk and Treasurer, Sturgeon Falls, Ontario.
Vant Hub, J. C., Jr., Assistant Secretary, Association of Commerce, Saint Paul, Minnesota.
Van Vleck, Chas., Secretary, Commercial Club, Waterloo, Iowa.
Wahl, Fred J., Secretary, Board of Trade, West Chester, Pennsylvania.
Warburton, Jas. H., Secretary, Chamber of Commerce, Marietta, Ohio.
Ward, W. E., Secretary, Merchants and Manufacturers Association, Little Falls, New York.
Warehime, O. C., Secretary, Board of Trade, Frederick, Maryland.
Watkins, H. B., Secretary, Commercial Club, Danville, Virginia.
Watson, Robert W., Secretary, Commercial Association, Crawfordsville, Indiana.
Weaver, R. E., Mayor, Hespeler, Ontario.
Webster, Charles H., Commissioner, Winnipeg Industrial Board, Winnipeg, Manitoba.
Weidenfeller, J. N., Secretary, Commercial Association, Ottumwa, Iowa.
Weinbaum, Edw. N., Statistician, Chamber of Commerce, Portland, Oregon.
Weiser, Eugene F., Secretary, Chamber of Commerce, York, Pennsylvania.
Werne, J. H., Jr., Saint Charles, Missouri.
Werner, Fred L., Secretary, Chamber of Commerce, Guthrie, Oklahoma.
Westbrook, Wm. E., Secretary, Chamber of Commerce, Ogdensburg, New York.
Wheeler, C. L., Secretary, Chamber of Commerce, Taunton, Massachusetts.
White, Robt. McKinney, Secretary, Board of Trade, New Castle, Pennsylvania.
Whitehead, Miles C., Secretary, Board of Trade, Garfield, New Jersey.
Whiting, H. L., Secretary, Chamber of Commerce, Olympia, Washington.
Whittemore, L. H., Secretary, Chamber of Commerce, Beacon, New York.
Williams, C. B., Secretary, Commercial Association, Huntington, Indiana.
Williams, C. S., Secretary, Chamber of Commerce, Mansfield, Ohio.
Williams, T. H., Mine Superintendent, Edwardsville, Pennsylvania.
Williamson, Geo., Mayor, Simcoe, Ontario.
Willis, Paul, Secretary, Commercial Association, Waukegan, Illinois.
Wills, P. L., Secretary, Chamber of Commerce, Danville, Illinois.
Wiltse, Hal F., Secretary, Chamber of Commerce, Chattanooga, Tennessee.
Wood, John, Secretary, Chamber of Commerce, Roanoke, Virginia.
Wright, M. N., Secretary, Business Men's Association, Gardner, Massachusetts.
Wunderlich, Secretary, Commercial Club, Cedar Rapids, Iowa.
Yale, F. L., Secretary, Commercial Club, Joplin, Missouri.
Yoerger, J. G., Mayor, Humboldt, Saskatchewan.
Young, A. McG., Mayor, Saskatoon, Saskatchewan.

KEY TO PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*. It is also short when alone in an unaccented syllable.

A vowel is *long* when accented and standing alone or in a syllable which ends in silent *e,* or when ending an accented syllable.

S is always soft, and never has the sound of *z*.

The hard sound of *c* is represented by *k*.

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch,* as in Bach: (**BACH,** *baK*).

N for the French *n,* as in Breton: (**BRETON,** *bre toN'*).

ö for the German *ö,* as in Göttingen: (**GÖTTINGEN,** *gö' ting en*).

ü for the German *ü,* as in Blücher: (**BLÜCHER,** *blüK' ur*).

THE WORLD BOOK
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Aa

A. Almost all the alphabets of the world, no matter how unlike they may be in other ways, have *a* as their first letter. But while in most of the languages in use to-day *a* stands but for one sound, that heard in *father,* in English it represents eight sounds, as in the words *father, fat, fate, fare, final, fall, what* and *ask.* It is used, moreover, to form digraphs, as in *heat* and *boat.*

It seems probable that the Phoenicians, who invented the alphabet, represented by their capital *A* an ox's head; but when the Greeks adopted the alphabet they turned this first letter upside down, making it look much like a capital *A* to-day, and thus the letter lost all of its picture quality. See ALPHABET.

In *music,* A is placed, in the treble clef, on the second space, second added line below and first added line above. In the base clef it is on the first space and fifth line. It is the sixth note in the diatonic scale of C. See MUSIC.

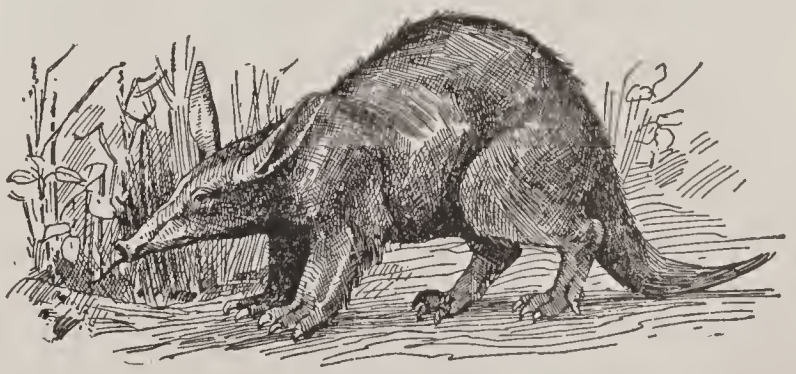
A 1, a term which, when used in its popular sense, is a slang phrase, but not objectionable. It is intended to denote a high quality of excellence or of a condition perfectly satisfactory. The origin of A 1 is due to Lloyd's agency in London for the insurance of vessels, and when placed opposite the name of a boat indicated absolute seaworthiness.

The leading American financial reporting agencies adopted the symbols, with variations, to indicate a business man's credit rating and capital. These are discussed at length under the heading COMMERCIAL AGENCY.

AACHEN, *ah'ken,* since 1815 the name of Aix-la-Chapelle (which see).

AARD-VARK, *ahrd-vahrk,* meaning *earth-pig* in Dutch, is an ant-eater found in South Africa. It has a pig-like snout, a long and flexible tongue covered with sticky saliva, large pointed ears and short, reddish hair. The limbs are very muscular. On the front feet are four, and on the hind feet, five powerful claws with which it burrows or tears to pieces the hills of ants on which it feeds. It sleeps by day and feeds by night. The total length of the animal is about five feet. The tail is about thirty inches in length.

The flesh is eaten by natives, though it tastes of formic acid derived from the bodies of the

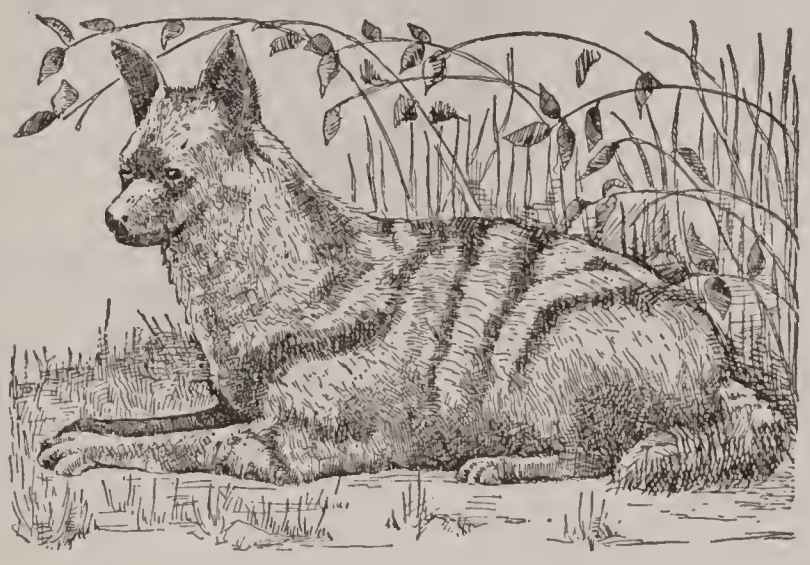


AARD-VARK

ants it eats. It is easily caught by closing its burrow while it is absent. When alarmed, it rushes to its home and endeavors to dig itself out of sight. A sharp blow with a stout stick will kill it.

AARD-WOLF, *ahrd-wulf,* meaning *earth-wolf* in Dutch, is a South African flesh-eating

animal resembling a hyena in its sloping back and its color, the body being gray, irregularly striped with black. It has five toes on the fore feet and the head is pointed. It feeds on dead animals, bugs and ants, but not on living animals, as its weak jaws and teeth prevent it from overcoming any but the very smallest



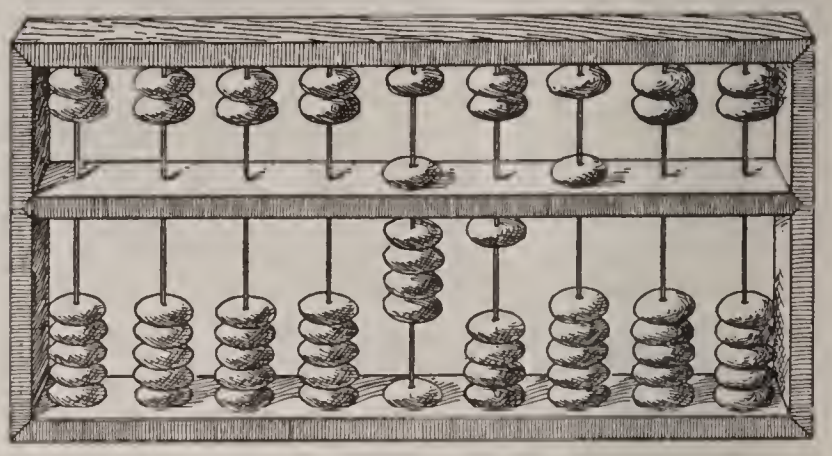
AARD-WOLF

of vertebrates. Its flesh is not edible. It is a night prowler, remaining secluded during the day, and it usually is very timid. It trusts to burrowing, rather than to flight, to escape from its enemies.

AARHUUS, *awr' hoos,* DENMARK; a very old town and a seaport, on the eastern coast of the peninsula of Jutland, noted primarily for its great Gothic cathedral, which dates from 1201 and is the oldest Christian church in the kingdom. Aarhuus has been the seat of a bishop since the year 948. Next to Copenhagen, the capital, it is the largest city in Denmark. Population, 1921, 74,256.

AARON, *air' un,* the first high priest of Israel, the elder brother of Moses. Because he was a more fluent speaker than his brother he acted as spokesman when Moses was working to bring about the deliverance of the Jews from the Egyptians, and he himself called down several of the most grievous plagues upon Pharaoh. While Moses was receiving his wonderful vision on Mount Sinai, Aaron listened to the pleadings of the Israelites and made for them an idol in the form of a golden calf. Because of the same sin which kept Moses out of the promised land Aaron, too, was excluded from Canaan, and the early Christians pointed out his grave on Mount Hor. See MOSES.

ABACUS, *ab' a kus,* a simple device for indicating numbers in addition and subtraction. It was in common use among the ancient Greeks and Romans, and is still to be seen in the shops in remote towns of Persia and other countries of the Far East. The Chinese abacus is called *shwanpan,* meaning *reckoning board.* In the United States and Canada the abacus is little more than a curiosity, but it was long



ABACUS

The number indicated by the position of the beads is 91,500. The method of counting is explained below.

used in primary schools for teaching the elements of number. It consists of a rectangular frame, in which are fixed parallel rods. On each rod are strung seven beads or balls, two above and five below the horizontal bar. When in use the abacus should be held so that the beads will stay in any position desired.

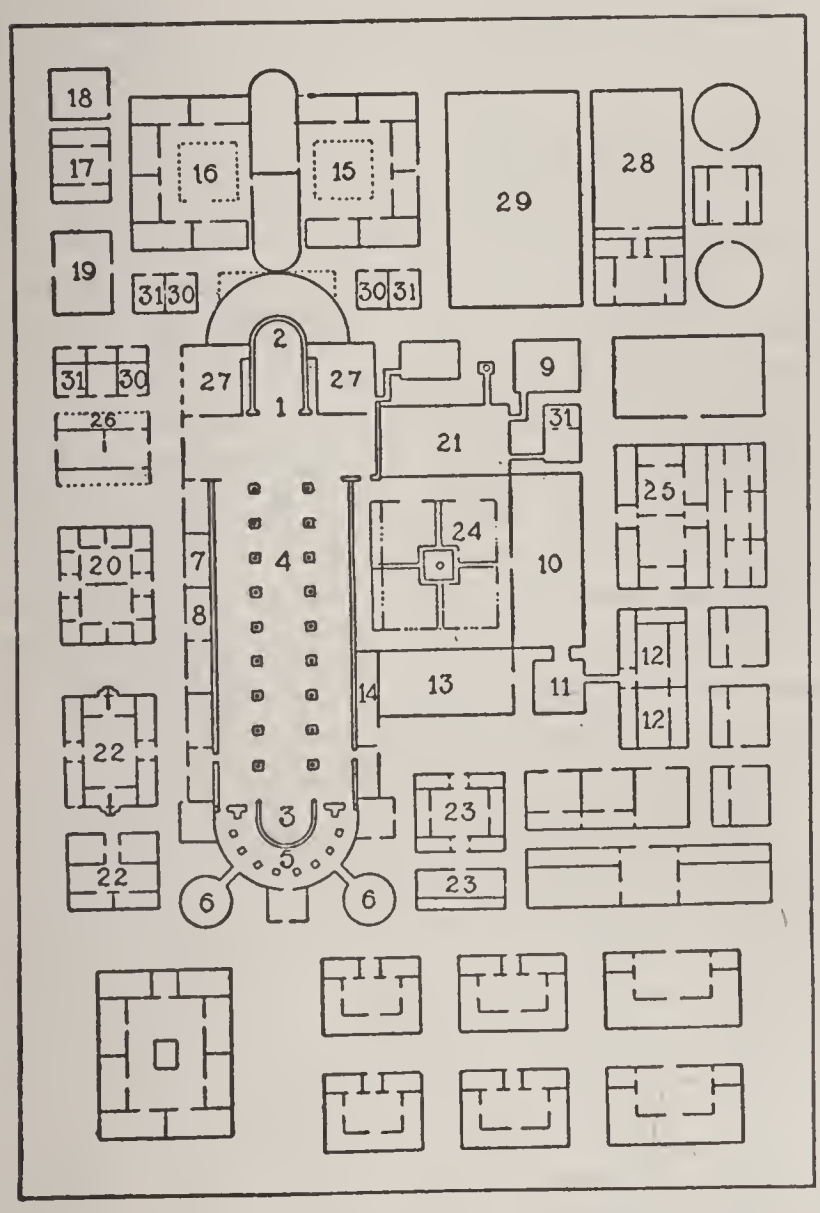
Method of Counting. Each bead below the bar counts one, and each bead above counts five; but to be included in a number the bead must be pushed close to the bar. In the illustration no beads are pushed up to bar in the right-hand or units column, or in the next column to the left, the tens column. From right to left, in order, the remaining figures are 5 in the hundreds column, 1 in the thousands and 9 in the ten-thousands, making the number 91,500. The size of the number which can be indicated by an abacus is limited only by the number of columns of beads; the highest number possible on the abacus shown in the illustration is 999,999,999.

ABALONE, OR EAR SHELL

ABALONE, *ab a lo' ne,* from its shape also called *ear shell,* is a mollusk whose shell resembles a small shallow dish and whose flesh

is an article of food near the seacoast of China and Japan. The shell is valuable for its lining of mother-of-pearl. The abalone lives on rocks at the bottom of the sea near shore, and is caught in scoops or taken by divers. In America it is found on the California coast, and has long been an article of food.

AB'BEY, in its original sense, a monastery or convent governed by an abbot or abbess (see ABBOT). Very commonly, now, however, the term is applied to a church which is or was



ABBEY OF SAINT GALL

A typical monastery of the ninth century. The church was the center, about which clustered the other parts, including the stables and the servants' quarters, which are unnumbered in the plan.

1. High altar
2. Altar of Saint Paul
3. Altar of Saint Peter
4. The nave
5. Paradise
6-6. Towers
7. Monks' guest-room
8. Schoolmasters' lodgings
9. Lavatory
10. Refectory
11. Kitchen
12-12. Bake-house and brew-house
13. Cellar
14. Parlor
15. Houses of novices
16. Infirmary
17. Doctor's house
18. Garden for medicinal plants
19. Houses for blood-letting
20. School
21. Dormitory
22-22. Houses for eminent guests
23-23. Houses for poor guests
24. Cloister
25. Factory
26. Abbot's house
27-27. Library, sacristy and vestry
28. Garden
29. Cemetery
30-30-30. Kitchens
31-31-31. Baths

once connected with a monastery, as Westminster Abbey. In England, it may mean a private residence which was formerly a part of a religious community but was given over by Henry VIII to secular purposes. Thus, Lord Byron's home was known as Newstead Abbey. See MONASTICISM.

ABBEY, EDWIN AUSTIN (1852-1911), one of the foremost American painters, most widely known for his series of mural paintings, *The Quest of the Holy Grail* (see HOLY GRAIL), in the book-delivery room of the Boston Public Library. He was born in Philadelphia, and had become known as an illustrator before his removal to London in 1883. There his illustrative work, especially that done for editions of Shakespeare, won him such fame that in 1901 he was commissioned to paint the coronation of Edward VII.

The last years of his life were devoted to mural decorations in the Pennsylvania state house. These pictures, which portray incidents in the history of the state, are recognized as his greatest work.

ABBOT, *ab' but,* a name derived from a Greek word meaning *father,* and therefore identical with the familiar "Abba, Father" of the New Testament (see *Mark* XIV, 36). In the early days of the monastic orders the title was given to any monk, but later its scope became more limited and it was applied only to the head of a monastery or abbey. During the Middle Ages, when the monasteries gained great wealth and importance, the abbots held positions of real power, many of them owing allegiance only to the Pope, and not to the bishops. Some of them gained political power, and at one time in England there were twenty-six in the House of Lords. Usually the abbot is chosen by the monks of the monastery which he is to serve, and is confirmed by a bishop or by the Pope. He holds office for life.

The corresponding head in a community of nuns is called an *abbess.*

ABBOTSFORD, the famous estate of Sir Walter Scott (which see). In connection with the story of Scott an illustration appears.

AB'BOTT, JACOB (1803-1879), an American writer of books for the young, chiefly known as the author of the very popular *Rollo Books,* a twenty-eight-volume series of stories of travel and adventure, with a youthful hero. Abbott was first a teacher and subsequently a clergyman, but after 1839 devoted himself entirely to writing. He published in all over 200 volumes, of which the best known, with the exception of those mentioned above, are the *Franconia Stories.*

AB'BOTT, LYMAN (1835-1922), a distinguished American clergyman and editor, the successor of Henry Ward Beecher, both as editor of the *Christian Union* (now *The Outlook*) and as pastor of Plymouth Church, Brooklyn. (See BEECHER, HENRY WARD.) He was born in Roxbury, Mass., a suburb of Boston, and was graduated at New York University in 1853. His father, Jacob Abbott, who wrote the *Rollo Books,* and his father's two brothers were Congregational ministers, but young Abbott studied and then practiced law for several years before he felt drawn toward the ministry. After his ordination in 1860 he was pastor in Terre Haute, Ind., for five years; this service was followed by four years at the New England Church in New York City. For twenty years he was then engaged in literary work, during the last years of the period being Beecher's associate as editor of the *Christian Union.* In 1888, the year after Beecher's death, he succeeded him at Plymouth Church and in 1893 became editor-in-chief of *The Outlook.* After 1899, when he resigned his pastorate at Plymouth, he devoted most of his time to writing and editing, in which he has wielded a powerful influence for good. Among his works are many volumes on religious and social topics. *Reminiscences* appeared in 1915; *Silhouettes of My Contemporaries,* in 1921.

LYMAN ABBOTT

AB'BOTT, SIR JOHN JOSEPH CALDWELL (1821-1893), a Canadian statesman, Sir John A. Macdonald's successor in 1891 as Premier of Canada. He was born at Saint Andrews, Que., and was educated at McGill University, where later he became dean of the faculty of law and one of the governors. His first appearance in public life was in 1857, when he contested the representation of his native county of Argenteuil; after an investigation that lasted two years he obtained the seat and was successively reëlected till 1874. In 1862, as solicitor-general, he introduced the use of stamps in payment of judicial and registration fees in Lower Canada; later he remodeled the jury law, and drafted and carried through Parliament an insolvency act which is the basis of Canadian law on this subject today. From 1887 to 1889 he was mayor of Montreal and at the same time a member of the Dominion Senate. In the Cabinet of Sir John Macdonald he became a member without portfolio, and after Macdonald's death in 1891 he became Premier. Old age and the cares of office overburdened him, however, and he resigned December 5, 1892. He died May 24, 1893.

ABBREVIATIONS, shortened forms of words, used to save time and space. In ancient and medieval times, when manuscripts were copied by hand, such labor-saving devices became very common, and after the invention of printing many of them persisted. At present, the abbreviations in general use are numerous. Frequently only the initial letter stands to represent a word, but since this would often give rise to ambiguity, other letters are added. One device in common use is the doubling of a letter to designate a plural or a superlative; thus *f.* means *loudly* and *ff. very loudly; p.* means *page* and *pp. pages.* Arbitrary symbols are not in reality abbreviations, but are used for the same purpose. The following is a list of contractions in very common use.

A. Acre.
A. B. *Artium Baccalaurcus,* Bachelor of Arts.
Abp. Archbishop.
acc., a/c or acct. Account.
A. D. *Anno Domini,* in the year of our Lord.
adj. Adjective.
Adjt. Adjutant.
ad lib. *Ad libitum,* at pleasure.
Adm. Admiral.
adv. Adverb.
aet. *Aetatis,* aged.
Ala. Alabama.
Alas. Alaska.
Alta. Alberta.
A. M. *Ante meridiem,* before noon; *Ars Magister,* Master of Arts.
amt. Amount.
Anon. Anonymous.
Apr. April.
Archd. Archdeacon.
Ariz. Arizona.
Arith. Arithmetic.
Ark. Arkansas.
Aug. August.
Aus. Austria.
Ave. Avenue.
Avoir. Avoirdupois.
B. A. Same as A. B. Bachelor of Arts.
Bapt. Baptist.
Bart. Baronet.
bbl. Barrel.
B. C. Before Christ; British Columbia.
B. D. *Bacealaureus Divinitatis,* Bachelor of Divinity.
Belg. Belgium.

Brig. Brigade, brigadier.
Brig.-Gen. Brigadier-General.
B. S. or B. Sc. Bachelor in the Sciences.
bu. Bushel.
B. V. *Bene vale,* farewell.
C. *Centum,* one hundred; centigrade; *circa,* about.
Cal. or Calif. California.
Can. Canada.
Capt. Captain.
Card. Cardinal.
C. B. Companion of the Bath.
cc. Cubic centimeter.
C. E. Civil Engineer.
C. E. F. Canadian Expeditionary Force.
cf. *Confer,* compare.
C. J. Chief Justice.
cm. Centimeter.
C. M. G. Companion of (the Order of) Saint Michael and Saint George.
c/o. Care of.
Co. Company; county.
C. O. D. Cash (or collect) on delivery.
Col. Colonel.
Col. or Colo. Colorado.
Con. *Contra,* against, in opposition.
Cong. Congress.
Conj. Conjunction.
Conn. or Ct. Connecticut.
cts. Cents.
C. V. O. Commander of the Victorian Order.
Cwt. Hundredweight.
d. Pence.
D. Five hundred; *denarius,* penny.
D. C. *Da Capo,* from the beginning—in music it means repeat; District of Columbia.
D. C. L. Doctor of Civil Law.
D. D. *Divinitatis Doctor,* Doctor of Divinity.
Dec. December; declination.
deg. Degree.
Del. Delaware; delegate; *delineavit,* he (or she) drew it.
Dept. or Dpt. Department.
D. Litt. Doctor of Literature. Same as Litt. D.
do. *Ditto,* the same.
doz. Dozen.
Dr. Debtor; doctor.
D. Sc. Doctor of Science.
D. S. O. Distinguished Service Order.
D. V. *Deo volente,* God willing.
E. East.
E. E. Electrical Engineer.
E. & O. E. Errors and omissions excepted.
e. g. *Exempli gratia,* for example.
E. M. Mining Engineer.
E. M. F. Electro-motive force.
Eng. England.
Esq. Esquire.
et al. *Et alii,* and others.
etc. or &c. *Et cetera,* and others, and so forth.
et seq. *Et sequentes, et sequentia,* and what follows.
f. *Forte,* loudly; franc.
Fhr. or F. Fahrenheit.
far. farthing.
Feb. February.
ff. *fortissimo,* very loudly; following.
Fig. Figure.
fl. Florin.
Fla. Florida.
f. o. b. Free on board.
Fr. France; French.
F. R. S. Fellow of the Royal Society.
ft. Foot; feet.
g. Gram.
Ga. Georgia.
gal. Gallon.
G. A. R. Grand Army of the Republic.
G. C. B. Knight Grand Cross of the Bath.
G. C. D. Greatest Common Divisor.
G. C. L. H. Grand Cross of the Legion of Honor.
G. C. M. G. Knight Grand Cross of Saint Michael and Saint George.
G. C. V. O. Knight Grand Commander of the Victorian Order.
Gen. General.
Ger. Germany.
Gov. Governor.
Gov.-Gen. Governor-General.
gr. Grain.
hhd. Hogshead.
H. M. S. His (or Her) Majesty's Ship, or Service.
Hon. Honorable.
hr. Hour.
Ia. Iowa.
ib. or ibid. *Ibidem,* in the same place.
id. *Idem,* the same.
Ida. Idaho.
i. e. *Id est,* that is.
Ill. Illinois.
in. inch; inches.
incog. *Incognito,* unknown.
Ind. Indiana; index.
Inst. *Instante mense,* this month.
interj. Interjection.
I. O. U. I owe you.
I. S. O. Imperial Service Order.
It. Italy.
Jan. January.
J. P. Justice of the Peace.
Jr. Junior.
Kan. Kansas.
K. B. King's Bench; Knight of the Bath.
K. C. King's Counsel.
K. C. B. Knight Commander of the Bath.
K. G. Knight of the Garter.
K. C. M. G. Knight Commander of St. Michael and St. George.
K. G. C. B. Knight of the Grand Cross of the Bath.
Kil. Kilometer.
Kilo. Kilogram.
Knt. or Kt. Knight.
Ky. Kentucky.
L. Fifty.
La. Louisiana.
lb. or lbs. *Libra* or *librae,* pound or pounds in weight.
L. C. Lower Canada; Lord Chamberlain.
L. C. J. Lord Chief Justice.
L. C. M. Least Common Multiple.
L. I. Long Island.
Lieut. Lieutenant.
Litt. D. Doctor of Literature.
LL. D. *Legum Doctor,* Doctor of Laws.
LL. M. *Legum Magister,* Master of Laws.
loc. cit. *Loco citato,* in the place cited.
M. *Monsieur; meridiem,* noon; one thousand; meter; mark.

M. A. Master of Arts; Military Academy.
Maj. Major.
Man. Manitoba.
Mar. March.
Mass. Massachusetts.
M. B. or Mus. B. *Musicae Baccalaureus,* Bachelor of Music.
M. C. Member of Congress; Master of Ceremonies; Master Commandant.
M. C. E. Master of Civil Engineering.
M. D. Doctor of Medicine.
Md. Maryland.
Mdse. Merchandise.
Me. Maine.
M. E. Methodist Episcopal; Military or Mechanical Engineer.
Messrs. *Messieurs,* gentlemen.
Mex. Mexico, or Mexican.
mi. Mile.
Mich. Michigan.
min. Minute.
Minn. Minnesota.
Miss. Mississippi.
Mlle. *Mademoiselle.*
mm. Millimeter.
Mme. *Madame,* Madam.
Mo. Missouri; month.
Mont. or Mon. Montana.
M. P. Member of Parliament; Member of Police; Methodist Protestant.
M. P. P. Member of Provincial Parliament.
M. R. Master of the Rolls.
Mr. Mister.
Mrs. Mistress.
M. S. Master of Science; *Memoriae saerum,* sacred to the memory.
MSS. *Manuscripta,* manuscripts.
Mus. D. Musical Doctor; Doctor of Music.
M. V. O. Member of the Victorian Order.
N. North; noun.
N. B. New Brunswick; *nota bene,* mark well, take notice.
N. C. North Carolina.
N. D. North Dakota.
N. E. New England; northeast.
Neb. Nebraska.
Nev. Nevada.
N. F. Newfoundland.
N. H. New Hampshire.
N. J. New Jersey.
N. M. New Mexico.
no. *numero,* number.
non. seq. *Non sequitur,* it does not follow.
Nov. November.
N. P. Notary Public.
N. S. Nova Scotia.
N. S. W. New South Wales.
N. W. T. North West Territories.
N. Y. New York.
N. Z. New Zealand.
O. Ohio.
Oct. October; *octavo,* eight pages.
O. K. (Slang). All right or correct.
Okla. Oklahoma.
O. M. Order of Merit.
Ont. Ontario.
Ore. Oregon.
oz. *Onza,* ounce.
p. Page; part; *piano,* softly.
Pa. or Penn. Pennsylvania.
P. C. Privy Council.
P. E. I. Prince Edward Island.
Penn. or Pa. Pennsylvania.
Per cent. *Per centum,* by the hundred.
Ph. B. *Philosophiae Baecalaureus,* Bachelor of Philosophy.
Ph. D. *Philosophiae Doctor,* Doctor of Philosophy.
pk. Peck.
P. M. *Post meridiem,* afternoon, evening; Past Midshipman; postmaster.
P. O. Postoffice.
Pop. Population.
pp. Pages; *pianissimo,* very softly.
P. P. C. *Pour prendre congé,* to take leave.
Prep. Preposition.
Pres. President.
Presb. Presbyterian.
Prof. Professor.
pron. Pronoun.
pro. tem. *Pro tempore,* for the time being.
Prox. *Proximo mense,* next month.
pt. Pint; part.
P. S. *Postscriptum,* postscript.
pwt. Pennyweight.
Q. E. D. *Quod erat demonstrandum,* which was to be proved.
qt. quart.
Que. Quebec.
q. v. *Quod vide,* meaning which see.
r. Rod.
recd. Received.
Rev. Reverend.
R. I. Rhode Island.
R. N. Royal Navy.
R. N. W. M. P. Royal North West Mounted Police.
R. R. Railroad.
R. S. V. P. *Répondez, s'il vous plaît,* answer, if you please.
Rt. Rev. Right Reverend.
Ry. Railway.
S. South; shilling.
Sask. Saskatchewan.
S. C. South Carolina; Supreme Court.
Sc. B. *Scientiae Bacealaureus,* Bachelor of Science.
scr. Scruple.
S. D. South Dakota.
sec. Second.
Sept. September.
Serg. Sergeant.
sq. Square.
Sr. Senior.
S. S. Sunday School.
St. Street; saint.
S. T. D. Doctor of Sacred Theology.
Supt. Superintendent.
Tenn. Tennessee.
Ter. Territory.
Tex. Texas.
Treas. Treasurer.
Twp. Township.
U. C. Upper Canada.
Ult. *Ultimo mense,* last month.
U. S. A. United States of America; United States Army.
U. S. M. United States mail.
U. S. N. United States Navy.
U. S. S. United States Senate; United States ship.
Ut. Utah.

Va. Virginia.
V. C. Victoria Cross.
viz. *videlicet,* to wit, namely.
vs. *Versus,* against.
Vt. Vermont.
W. West.
W. A. Western Australia.
Wash. or Wn. Washington.
W. C. T. U. Woman's Christian Temperance Union.
Wis. Wisconsin.
wt. Weight.
Wy. Wyoming.
Xmas. Christmas.
yd. Yard.
Y. M. C. A. Young Men's Christian Association.
Y. W. C. A. Young Women's Christian Association.
yr. Year.

For a very complete list, including all abbreviations ever used, see an unabridged dictionary.

ABDICA'TION, the resignation of a ruler or sovereign. The word *abdication* originally had the same meaning as *renunciation,* a voluntary withdrawal, and did not apply to forced resignations or *depositions.* In modern use abdication may be either voluntary or involuntary. The more important abdications follow:

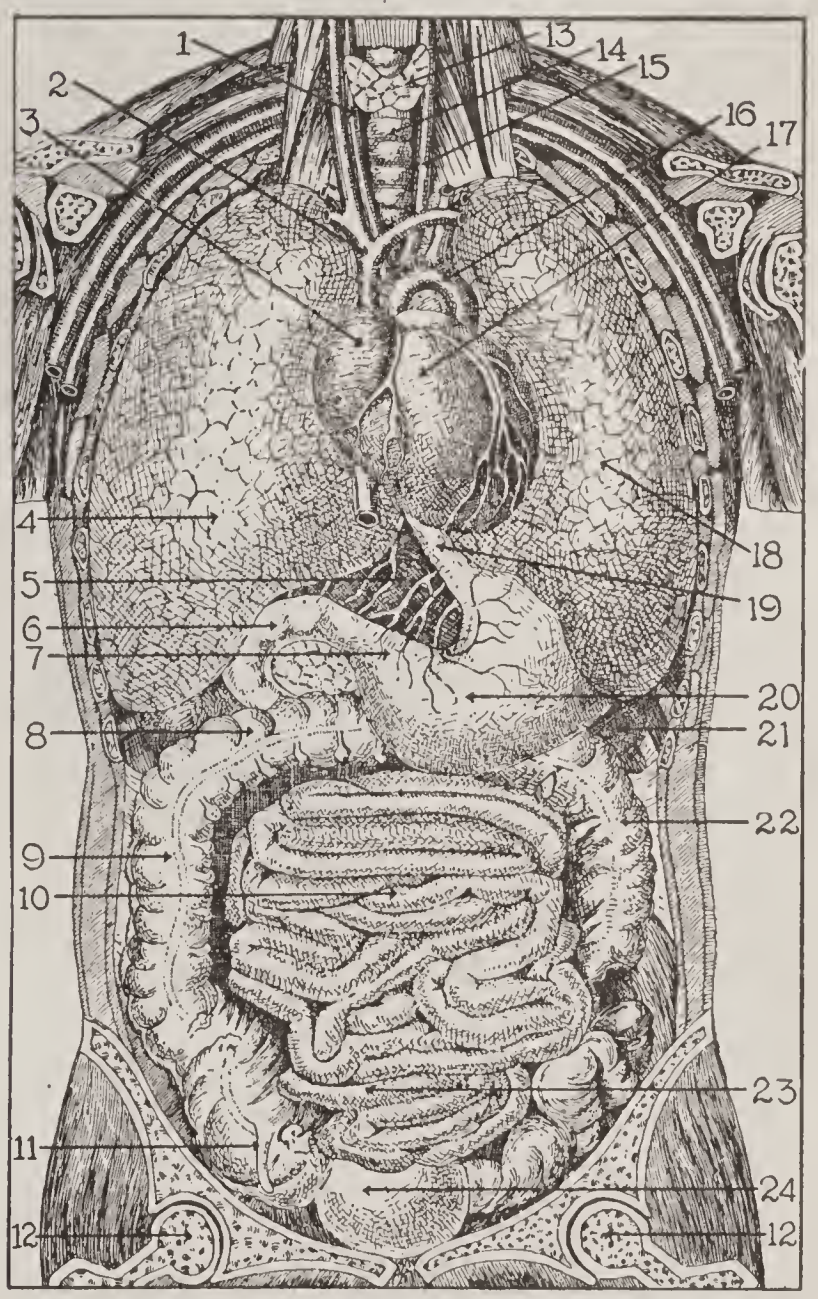
Charles Emmanuel IV of Sardinia	June 4, 1802
Charles IV of Spain	March 19, 1808
Joseph Bonaparte of Naples	June 6, 1808
Gustavus IV of Sweden	March 29, 1809
Louis Bonaparte of Holland	July 2, 1810
Napoleon of France	April 14, 1814
	June 22, 1815
Victor Emmanuel of Sardinia	March 13, 1821
Charles X of France	August 2, 1830
William I of Holland	October 7, 1840
Louis Philippe of France	February 24, 1848
Ferdinand of Austria	December 2, 1848
Charles Albert of Sardinia	March 23, 1849
Isabella II of Spain	June 25, 1870
Amadeus I of Spain	February 11, 1873
Abd-ul-Aziz of Turkey	May 30, 1876
Abd-ul-Hamid of Turkey	April 27, 1909
Pu-Yi of China	January 1, 1912
Nicholas II of Russia	March 15, 1917
Constantine I of Greece*	June 12, 1917
Ferdinand I of Bulgaria	October 3, 1918
Charles I of Austria	November 12, 1918
William II of Germany	November 28, 1918

*Restored in 1920; second abdication, 1922.

ABDOMEN, *ab doh' men,* in man, the cavity which contains the intestines, liver, stomach, kidneys and other organs. It is the lower part of the trunk, and is separated from the thorax, or upper cavity, by the diaphragm. The lower end of the cavity is bounded by the pelvic bones. The term *abdomen* is also applied collectively to all the organs contained in this cavity. The entire cavity is lined by a thin membrane called the *peritoneum* (meaning, in Greek, *to fold about* or *over*). The peritoneum is folded over the organs in such a way as to keep them in their proper positions, but also to allow them any necessary freedom of motion. It is subject to an inflammation practically the same as that which causes appendicitis.

Related Subjects. The anatomy and physiology of this part of the body will be made clear by a careful reading of the articles on the following topics:

Bile
Chyle
Chyme
Diaphragm
Digestion
Gastric Juice
Intestines
Kidneys
Liver
Pancreas
Pelvis
Peritoneum
Spleen
Stomach



EXPLANATION OF DIAGRAM

1. Innominate artery
2. Vena cava
3. Right auricle of heart
4. Right lung
5. Liver
6. Duodenum
7. Pylorus
8. Transverse colon
9. Ascending colon
10. Jejunum
11. Appendix
12. Head of femur
13. Thyroid gland
14. Trachea
15. Left carotid artery
16. Arch of aorta
17. Left ventricle of heart
18. Left lung
19. Cardiac orifice of stomach
20. Stomach
21. Spleen
22. Descending colon
23. Ileum
24. Bladder

In the above illustration not only is the abdominal cavity shown, with its contents, but also the organs above it, that the clear connection between the two sections may be evident.

ABDUCTION, *ab duc' shun,* a legal term applied to the forcible removal of a woman in order to secure her fortune or her person, or to compel her to comply with certain demands. In law it is regarded as distinct from like removal of a child of either sex, which is called *kidnapping.* Abduction constitutes a criminal offense and is severely punished upon conviction. The penalty is most severe in England and Canada, where the laws prescribe a minimum penalty of five years' imprisonment, with a maximum sentence of penal servitude for life. In the United States the punishment varies according to the laws of the state in which the offense occurs, usually consisting of a fine and imprisonment from one to five years.

ABD-UL-HAMID II, *ahbd ul hah meed',* (1842-1918), thirty-fourth sultan of the Turkish Empire, the man whose harsh treatment of Christians called forth from Gladstone the famous epithet, "Unspeakable Turk." He was the son of Sultan Abd-ul-Medjid, and succeeded to the throne on the deposition of his elder brother, Sultan Murad V, in 1876. Turkey at that time was in a disturbed condition, but neither then nor later did Abd-ul-Hamid take any serious steps toward reform. The Russo-Turkish War (which see) came as a climax to the disturbances in Turkey, and the empire would have been completely overthrown except for the interference of the European powers. Turkey, however, lost Bulgaria, Bosnia and Herzegovina, Montenegro, Roumania and Serbia, together comprising more than one-half of its European possessions.

ABD-UL-HAMID

For thirty-three years one of the very few absolute monarchs in the world.

For the next thirty years Sultan Abd-ul-Hamid was a sorry figure. His empire suffered from all sorts of internal disorders. He frequently promised reforms, usually at the demand of one or other of the European powers, but seldom fulfilled promises. Finally in 1908 he was compelled by the revolutionary party of Young Turks to grant a constitution. In 1909 he was deposed and was succeeded by his younger brother, who ascended the throne with the title of Mehmet V. After three years' banishment, Abd-ul-Hamid was taken back to Constantinople in 1912 and there kept in close confinement. See YOUNG TURKS.

ABECKET, THOMAS. See BECKET, THOMAS À.

A'BEL, the second son of Adam and Eve (*Gen.* IV, 2). He was a shepherd and, according to the Biblical story, offered sacrifices "of the firstlings of his flock and of the fat thereof" in such a spirit that they were regarded with greater favor by the Lord than were Cain's offerings of the fruits of the ground. The latter, enraged at this, slew his brother. See CAIN, for the story of the first murder.

ABELARD, PIERRE, *ab' e lard, pe air',* (1079-1142), a French philosopher and theologian, famous in his own time as one of the boldest and most original thinkers of his day, but remembered in the centuries since his own chiefly for his association with Héloïse. He was born at a village in Brittany, went to Paris as a student at the age of twenty, and there established himself as a philosophical lecturer in 1113. His reputation became very great, for he could conquer in debate the most eloquent masters; and students came to him from Rome, from England, and from Germany.

Chosen by Canon Fulbert as teacher to his niece, the beautiful and accomplished Héloïse, Abelard promptly fell in love with his pupil. When the affair reached the ears of Fulbert, the couple fled. The two were married with the uncle's consent, and Abelard returned to Paris, but Héloïse denied the marriage that she might not interfere with his advancement in the Church, and the union was annulled by Fulbert. Abelard thereupon became a monk and Héloïse a nun, but the former continued his philosophical and theological lectures. The Church authorities condemned his teachings as heretical, however, and he withdrew to Nogent-sur-Seine, where he built an oratory which he called the Paraclete. Until his death he kept up his correspondence with Héloïse, who survived him twenty-two years, and her *Letters* to him take rank in literature with the most masterly expressions of love and devotion. Their bodies were laid side by side at the Paraclete, but in 1817 they were transferred to Paris.

ABERCROM'BIE, JAMES (1706-1781), a soldier who commanded the British forces in America at the beginning of the French and Indian War. He attacked Ticonderoga on July 8, 1758, but was defeated with heavy loss.

Six weeks later he was ordered home, and was succeeded as commander-in-chief by Baron Amherst. Later he was elected to Parliament, and strongly supported the policy of George III against the American colonies.

ABERDEEN′, the fourth largest city of Scotland and capital of Aberdeenshire, on the North Sea, 130 miles north of Edinburgh, the capital of Scotland. It is locally known as the "Granite City" because most of its buildings are constructed of granite quarried in the vicinity. Aberdeen, like Glasgow, is famous throughout the world for the extent to which it has carried municipal ownership. All public utilities, including electric tram-car service, gas and water works, electric light, public baths, markets and cemeteries, are owned by the municipality. The profits from operation are used for improvements and for the reduction of taxation. Working people in Aberdeen are better housed than in most cities in Great Britain; several model tenements erected by the city set an example which has been followed by some private owners.

Although Aberdeen was a prosperous community as early as the middle of the twelfth century, it suffered much in the wars between England and Scotland and its present prosperity dates only from 1818, when the rediscovery of methods for polishing granite laid the basis for a new industrial development. Granite in all forms, both polished and in the rough, is the chief item of export, but fish, coal and spirits are also important. The chief manufacturing industries yield woolen, cotton, jute and linen goods. Aberdeen has an excellent harbor, with immense floating docks and a breakwater, and has steamship connection with London, Hull and other ports. It is the junction point for three main lines of railway.

Aberdeen is one of the most beautiful cities in Great Britain. Union Street, its principal thoroughfare, though less famous than Pall Mall, Unter den Linden or Champs Elysées, is one of the handsomest avenues in Europe. Among many notable buildings are the county and municipal halls, both of native granite, in the Scotch baronial style. Aberdeen is noted for its numerous educational institutions, among which the University of Aberdeen, with an average of 1,300 to 1,400 students, is most important. Population of the city in 1921, 158,969.

ABERDEEN, John Campbell Gordon, Seventh Earl of (1847-), a prominent British political leader, best known as Governor-General of Canada from 1893 to 1898. Aberdeen entered politics as a Conservative, but in 1876 he forsook the party, and was thereafter a leading Liberal and supporter of William E. Gladstone. In 1886, during the short third ministry of Gladstone, he was Lord-Lieutenant of Ireland, and from 1905 to 1915 again held that office. Of great personal popularity, he stands among the best-liked of the men who have represented the king at Dublin and at Ottawa. While in Canada he was given honorary degrees by Queen's, McGill, Ottawa, Toronto, Laval and other universities. One of his minor titles is baronet of Nova Scotia, originally granted to one of his ancestors in 1642.

ABERDEEN, S. D., the county seat of Brown County and the trade center for a large section in the northeastern part of the state. It is situated 125 miles northeast of Pierre, the capital, and 280 miles west of Minneapolis, on the Chicago, Milwaukee & Saint Paul, the Chicago & North Western, the Minneapolis & Saint Louis and the Great Northern railways. Aberdeen was founded in 1880, was incorporated in 1882, and was one of the first cities in the Union to adopt the commission form of government. In 1920 the population was 15,337, an increase of 4,584 since 1910. The area is little less than three square miles.

Aberdeen is a commercial center and is largely interested in manufactures, the value of products reaching over $6,000,000 yearly by 1920. Boots, shoes, clothing, flour, chemicals and artesian well supplies are the principal manufactures, and there are creameries, marble-works and several grain elevators. In addition to the public schools the city has a state normal school and a fine library. The Federal building, courthouse and city hall are the notable buildings. C. OF C.

ABERDEEN, Wash., a city in Gray's Harbor Co., in the southwestern part of the state, noted for its lumber industry. It is situated on Gray's Harbor, sixteen miles from the open sea, fifty miles west of Olympia by rail, ninety-six miles southwest of Tacoma and 150 miles southwest of Seattle. The Northern Pacific and Chicago, Milwaukee & Saint Paul railways and the Oregon Washington Railway and Navigation Company serve the city. Aberdeen was founded in 1889. Swedes, Norwegians, Finns and Poles comprise the foreign element of the population, which in 1920 was 15,337, an increase of 12 per cent since 1910. The area is eight square miles.

Gray's Harbor is one of the three large

harbors of the Pacific coast of the United States; the government has expended $5,000,000 here on the giant rock and concrete jetties and on widening and deepening the channel, which now permits the entrance of the world's largest freight carriers. Through this harbor 714,-037,000 feet of lumber were shipped in 1915, more than from any other port in the world. Logging and lumbering were formerly the chief industries, but recently much attention has been given to agricultural and dairying development. The fishing industry is important, and extensive salmon and clam canneries are located here. Beside fifteen lumber and shingle mills, the city has three shipyards, three foundries, and furniture, woodenware and other manufactories. Aberdeen has a $75,000 city hall, a $100,000 Electric building, the $150,000 Finch building, the $125,000 Weatherwax High School and a $40,000 library. The business district of the city was swept by fire in 1902 and in 1903. C. OF C.

ABERRA'TION, a word which means to wander or stray from a given path, or from a right course. We apply the term to a condition known as *mental aberration,* meaning treacherous or defective memory, sometimes not serious, but often resulting in total loss of that faculty and even in insanity. These conditions are due to causes which only physicians can explain.

In physics, the term is used to indicate the failure of rays of light to meet at a common point when they are reflected by a concave mirror or refracted by a convex lens (see MIRROR; LENS). During the passage of parallel rays through a double convex lens, the rays near the edge come to a common point, or focus, sooner than those which pass through near the center. As a result, an indistinct image is formed. In the case of the camera, telescope and other optical instruments the defect is overcome by means of a diaphragm which shuts off the edge. The diaphragm serves to make the outline of the image more distinct, but diminishes its brilliancy.

In astronomy, the difference between the true and the observed position of a heavenly body is called aberration.

ABILENE, *ab' i leen,* TEX., a growing city in Taylor County, of which it is the county seat. It is situated northwest of the geographical center of the state, on the Abilene & Southern, Texas & Pacific, and Wichita Valley railways, 160 miles southwest of Fort Worth. Between 1910 and 1920 the population increased from 9,204 to 10,274. The area is less than five square miles.

Abilene is the center of a stock-raising, cotton and farming section. It has large grain elevators and manufactories of saddlery, harness and lumber, but its chief interests lie in cotton-gins and flour mills. Beside the public schools the city has a Baptist college and a Carnegie Library. Abilene has a Federal building and a state epileptic colony. The commission form of government is in operation.

ABOLITIONISTS, *ab o lish' un ists,* in American history, a large number of people in the Northern United States who became influential during the first half of the nineteenth century in urging the immediate abolition of slavery. The importance of the movement dates from the beginning of the work of William Lloyd Garrison in 1829, and the formation of the American Anti-slavery Society in 1833. Division of opinion soon developed, Garrison and his followers advocating abolition even at the cost of disunion of the republic, while the more moderate party wished abolition through constitutional forms. The latter formed the Liberty party and later the Free-Soilers, and finally, in 1856, joined the Republican party. Among the prominent leaders of the radical Abolitionists were Wendell Phillips and John G. Whittier.

ABOMEY, *ah bo may',* before the capture of the country by the French in 1892, the capital of the kingdom of Dahomey, in West Africa, near the coast of Guinea. The town is surrounded by a mud wall and a trench which encloses a large tract of land, most of which is under cultivation. An important trade in ivory, gold and palm oil is carried on. It was at one time an important slave market, which traffic the French abolished. Population, about 11,000.

ABORIGINES, *ab o ridg' e neez,* the first or earliest known inhabitants of a section or country. The word is of Latin origin, and literally translated means *from the beginning.* The ancient Romans applied it to the mythical race said to have been found by Aeneas when he reached the mouth of the Tiber. Some modern scholars have suggested *Aborigines* was the proper name for these people, but this theory was unknown to the Romans.

The aborigines throughout the world have invariably given way to newer races from other parts of the globe. The migration of peoples has made it uncertain, in some cases, who the original inhabitants were, and the term *abo-*

rigines is frequently applied in a general sense to any native race existing before the white man came. Thus the mound-builders, the cliff-dwellers, the Aztecs and the other Indians of North and South America are aborigines. The study of the conditions under which they lived is a part of archaeology; and that of their relations to other races and to the animal world in general belongs to anthropology. Both of these terms are explained in this work under their titles. See, also, MOUND-BUILDERS; CLIFF-DWELLERS; INDIANS; AZTECS.

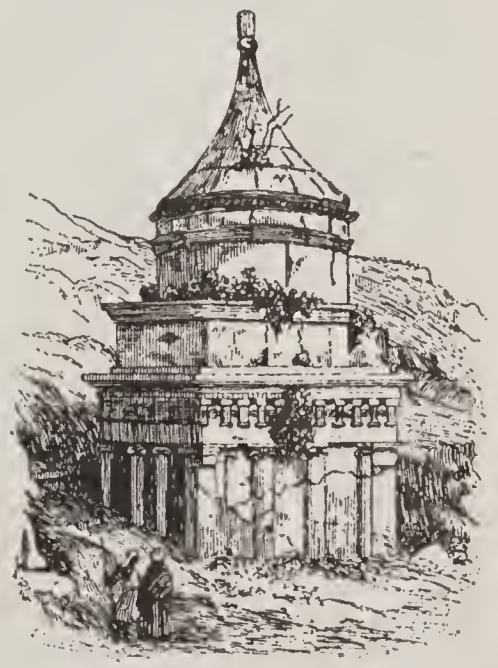
ABOUKIR, or **ABUKIR,** *ah boo keer',* in Egypt, a small village on the Mediterranean Sea, thirteen miles northeast of Alexandria. In Aboukir Bay, in 1798, occurred the naval Battle of the Nile, in which the English fleet under the command of Lord Nelson annihilated a French fleet. Near this place, also, in 1799 Napoleon defeated the Turks under Mustapha. In 1801 British forces landed here and compelled the French to evacuate Egypt; this is known in history as the Battle of Alexandria.

A'BRAHAM, the greatest of the Hebrew patriarchs, the real founder of the Israelites. His name was originally Abram, and his birthplace was Ur of the Chaldees, but according to the Biblical story he heeded the call of God and journeyed toward a new land. When he was an old man God made a covenant with him and gave him a new name, Abraham, signifying that he was to be "a father of many nations." Up to this time Sarah, Abraham's wife, had been childless, though Abraham had had one son, Ishmael, born to him by Hagar; but Sarah afterward gave birth to a son, Isaac, who became the legitimate heir of his father. Abraham died at the age of 175, "an old man and full of years," and was buried at Machpelah. His story is told in *Genesis,* chapters XI to XXV. See, also, ISAAC; ISHMAEL.

ABRUZZI, *ah broot' see,* PRINCE LUIGI AMADEO, DUKE OF THE (1873-), an Italian naval officer, mountain-climber and Arctic explorer, son of Amadeus, king of Spain, and first cousin to Victor Emmanuel III, king of Italy. He was the first (1897) to ascend Mount Saint Elias, and in 1900 gained fame by his attempt to reach the North Pole. Though unsuccessful, he attained 86° 39′ N. latitude, the most northerly point reached up to that time. In 1906 he ascended the peaks of Mount Ruwenzori, in equatorial Africa, and in 1909 led a mountain-climbing expedition to the Himalayas, where he established a new record for altitude by reaching the top of Mount Austen, 24,600 feet above sea-level. The records of these explorations he has published in several books. He is of peculiar interest to the American people because in 1912 only the objections of the royal family prevented him from marrying a daughter of United States Senator Elkins of West Virginia. In 1915, when Italy joined the allies in the War of the Nations, the Duke of the Abruzzi was placed in command of the Italian fleet.

DUKE OF THE ABRUZZI

AB'SALOM, the third, and favorite, son of David, king of Israel. He was handsome, clever, and possessed of a manner that won him universal love, and he made use of his popularity to stir up a rebellion against his father. Defeated in battle and fleeing before the soldiers of his father, he was swept off his horse by an overhanging branch which held him by his flowing curls until Joab, one of David's captains, approached and killed him. David was overwhelmed with grief. This tragic story, which is told in *II Samuel,* is the subject of a very popular poem, *The Death of Absalom,* by Nathaniel P. Willis. David's love for his son is strikingly shown in the following lines:



THE TOMB OF ABSALOM

In the Valley of Jehoshaphat, close by the lower bridge over the Kedron.

But oh! for Absalom—
For his estranged, misguided Absalom—
The proud, bright being who had burst away
In all his princely beauty, to defy
The heart that cherished him—for him he poured,
In agony that would not be controlled,
Strong supplications, and forgave him there
Before his God, for his deep sinfulness.

ABSCESS, *ab' ses,* a result of disease or injury, which may be described as a cavity

filled with pus, and located in the fleshy tissues of the human body. No matter what cause produces an abscess, the first step in its formation is an overcharge of blood in the capillaries, due to inflammation. The inflammation soon slackens the flow of blood; the white corpuscles of the blood combat the gathering bacteria, and serums form (see BACTERIA; SERUMS). The tissues gradually weaken and dissolve, and the resulting cavity becomes the seat of the abscess. The pus seeks exit, and attacks the weakest portion of the tissue walls, usually in the direction of the skin. Abscesses usually are very painful, especially just before they "break." After breaking, the cavity should be drained and all pus removed. Breaking may frequently be induced by poultices which draw the infection nearer the surface, although quite often the abscess must be lanced, to allay the increasing pain.

AB'SINTH, or **AB'SINTHE,** the most harmful of all alcoholic liquors. People who habitually drink absinth to excess always have weak digestions and disordered nerves, and they usually lessen their mental capacity, even to the point of idiocy. Absinth is about seventy-five per cent alcohol, as compared with six to eight per cent in the strongest beer. The peculiar harmfulness of absinth is due to *absinthol,* the essential oil of wormwood (which see), and to other poisonous oils of strong flavors.

Absinth is called the national drink of France. It is to the Frenchman what beer is to the German, vodka to the Russian, and Scotch and soda to the Englishman. Not all Frenchmen drink it, but thousands of them enjoy a sip or two every day. Even this sip, however, was denied them in 1914, soon after the War of the Nations began; the French government absolutely prohibited the sale or manufacture of absinth. Its importation into the United States or transportation from one state to another has been forbidden since October 1, 1912. A heavy duty is levied on imports of absinth into Canada.

ABSOLUTION, *ab so lu' shun,* remission of a penitent's sin, in the name of God. In general, a priest of the Roman Catholic Church may pronounce absolution if he believes that the sinner has made a full and sincere confession, but there are certain sins from which only a higher officer of the Church can absolve the penitent. The Roman Catholic Church founds its doctrine of absolution upon Christ's words, as recorded in *John* XX, 23.

ABSORPTION, *ab sorp' shun,* a compound of two Latin words meaning *to swallow away* or *to drink up.* Absorption, then, means the intermixture of two things in such a way that one of them is taken up by the other and apparently vanishes. We speak of a solid absorbing a liquid or a gas and of a liquid absorbing a gas. Thus, a sponge absorbs water; a lampwick, oil; charcoal, ill-smelling gases; and water, ammonia gas. The absorbed substance is, of course, not annihilated nor is it without effect upon the properties of the product. A wet sponge differs in many ways from a dry one, and ammonia water is obviously different from pure water. But the mixed product is more nearly like the absorbing than like the absorbed constituent.

The quantities of the different gases which a given quantity of water will absorb vary greatly. At its freezing temperature (32° F.) 100 gallons of water will absorb only one and one-half gallons of nitrogen, two volumes of hydrogen or four gallons of oxygen. Of carbon dioxide, however, the 100 gallons of water will take up 170 gallons, of hydrochloric acid 50,500 gallons, of ammonia 130,000 gallons, and of hydriodic acid gas no less than 157,000 gallons (making a mixture which, though nine-tenths gas by weight, is in the liquid state—a striking instance of the less swallowing the greater.

Fishes and other animals which live under the water are dependent upon the absorbed oxygen for their respiratory supply. The amount of any gas which any liquid will absorb is always greater the lower the temperature and the greater the pressure applied. Soda-water is water charged with carbon dioxide under pressure. When the cork of a soda-water bottle is drawn, the pressure in the bottle is released and the excess of gas, bubbling out, produces a foam upon the liquid. Beer and champagne behave similarly.

Charcoal (which see) is the solid substance which excels as an absorbent of gases, its use as a deodorizer being due to this property. Calcium chloride and zinc chloride and many other substances absorb water vapor from the air. In damp weather even common salt will absorb enough water from the air to cake in a salt-shaker. Dry wool and silk and, to a less extent, dry cotton and linen, absorb moisture from the air. Caustic soda and caustic potash absorb both water vapor and carbon dioxide. Some solid substances when brought into contact with a solution absorb one or more of the dissolved substances from the water. Boneblack

takes up coloring matters from sugar solutions (see CARBON) and clay takes up from soil-water some of the substances required by plants—for instance, potassium, ammonia and phosphoric acid.

In Physics. It is common to speak of the absorption of light and of heat. Colored glasses absorb some of the colors of white light, allowing the others to pass. When light falls upon a bright surface such as a mirror it is not all reflected. Part of it is absorbed and converted into heat. When the surface is dull and dark, much less of the light is reflected and correspondingly more is absorbed. In some projection lanterns a glass cell filled with water, placed between the electric arc and the lenses, absorbs the heat but allows the light to pass through. See LIGHT; HEAT.

In Physiology. Here the word absorption is applied to the process by which the digested food is taken into the blood and lymph. Medicine and poisons are absorbed in the same way. The term is applied also to the process by which waste matters in the tissues are taken up by the blood. When a swelling or an abscess disappears the substances from the blood which were temporarily deposited in the sore spot are said to have been absorbed (or resorbed) by the blood. For the most part plants absorb moisture and nutritive juices through their roots, and carbon dioxide through their leaves. Insectivorous plants are able to absorb organic matter by the leaves. In the lungs of animals the blood exposed to the air in the fine thin-walled capillaries absorbs oxygen. Chemical union of the oxygen with a substance (hemoglobin) in the blood corpuscles takes place. The product (oxy-hemoglobin) is bright red. This is why the blood in the arteries (which has recently been aerated in the lungs) is so much brighter in color than the blood in the veins (which is on its way back from the tissues to the heart to be again sent to the lungs for aeration). See CIRCULATION OF THE BLOOD. J.F.S.

Related Subjects. A study of the articles on the following subjects will make clearer the processes of absorption:

IN PHYSIOLOGY

Blood	Lacteals
Capillarity	Lymphatics
Digestion	Skin
Hypodermic Injection	

IN PLANTS

Cell	Osmosis
Leaves	Roots

ABT, FRANZ (1819-1885), a German writer of songs, including both words and music, best known to the general public as composer of such popular verses as *When the Swallows Homeward Fly.* These songs, while they have little of the lasting quality of truly great music, make a universal appeal.

Abt was born at Eilenburg, studied at Leipsig, and in 1841 became music master at the court theater in Zurich. In 1852 he went to Brunswick as a musical director of the court theater, and there he remained until 1881. He composed a number of instrumental selections for the piano, but they were not as well received as his vocal numbers.

ABU'TILON, a plant which in most sections is regarded as a common weed. It is known both as velvet leaf, from the smoothness of its leaves, and as butter-print, due to the former custom of housewives of using its deeply-veined leaves to stamp its design on rolls of butter. The plant has a pretty, yellow, bell-shaped flower. The seeds are black and glossy, larger than most grass seeds, which makes it possible to detect their presence before sowing.

ABUTILON
Flower and leaf.

ABYDOS, *a by' doss,* one of the most ancient cities of Upper Egypt, famous as the burial place of Osiris. To this city the bodies of pious Egyptians were brought from all parts of Egypt for burial near the tomb of the god. Magnificent temples to Osiris were built here by King Rameses the Great and King Seti I. Each of these kings left in the temple built by him a list of his predecessors on the throne of Egypt. One of these tablets was discovered in 1818 and the other in 1864. The ruins of Abydos are six miles from the left or west bank of the Nile. The present name is Arabet-el-Madfun.

Abydos, an ancient city of Asia Minor, famous for its association with the legend of Hero (which see) and Leander. Abydos was on the south shore of the Hellespont, now called the Dardanelles, at its narrowest point. From Abydos Leander swam nightly to Sestos, on the opposite shore, to see Hero, his beloved. In modern times Lord Byron, the poet, accomplished this feat once in emulation of the ancient hero. Near Abydos, too, Xerxes and his army in 480 B. C. crossed to Europe.

ABYSSINIA, *ab i sin' i a,* a country in Northeast Africa, notable as being one of only two African countries not directly owned or controlled by European powers. The other is Liberia, on the other side of the continent. The latter was settled by its present governing population within a century, but Abyssinia has the great distinction that it has always been ruled by its native people. And nobody knows how old it is, or who its earliest rulers were; records do not reach back far enough into the mysterious past. Tradition says that the Queen of Sheba, of whom the Bible speaks, once ruled the country, although some scholars believe she belonged to a country to the east, across the Red Sea. Certainly it was once a part of ancient Ethiopia, hundreds of years before the birth of Christ.

The country once had an ample seacoast, but today, due to the demand of European powers, not a mile of shoreline is owned by Abyssinia. Britain, France and Italy have established themselves on the coast in territories called protectorates (see PROTECTORATE), which probably only the ill fortunes of war or the arts of diplomacy will ever be able to take away from them and, even in such event, to no advantage to Abyssinia.

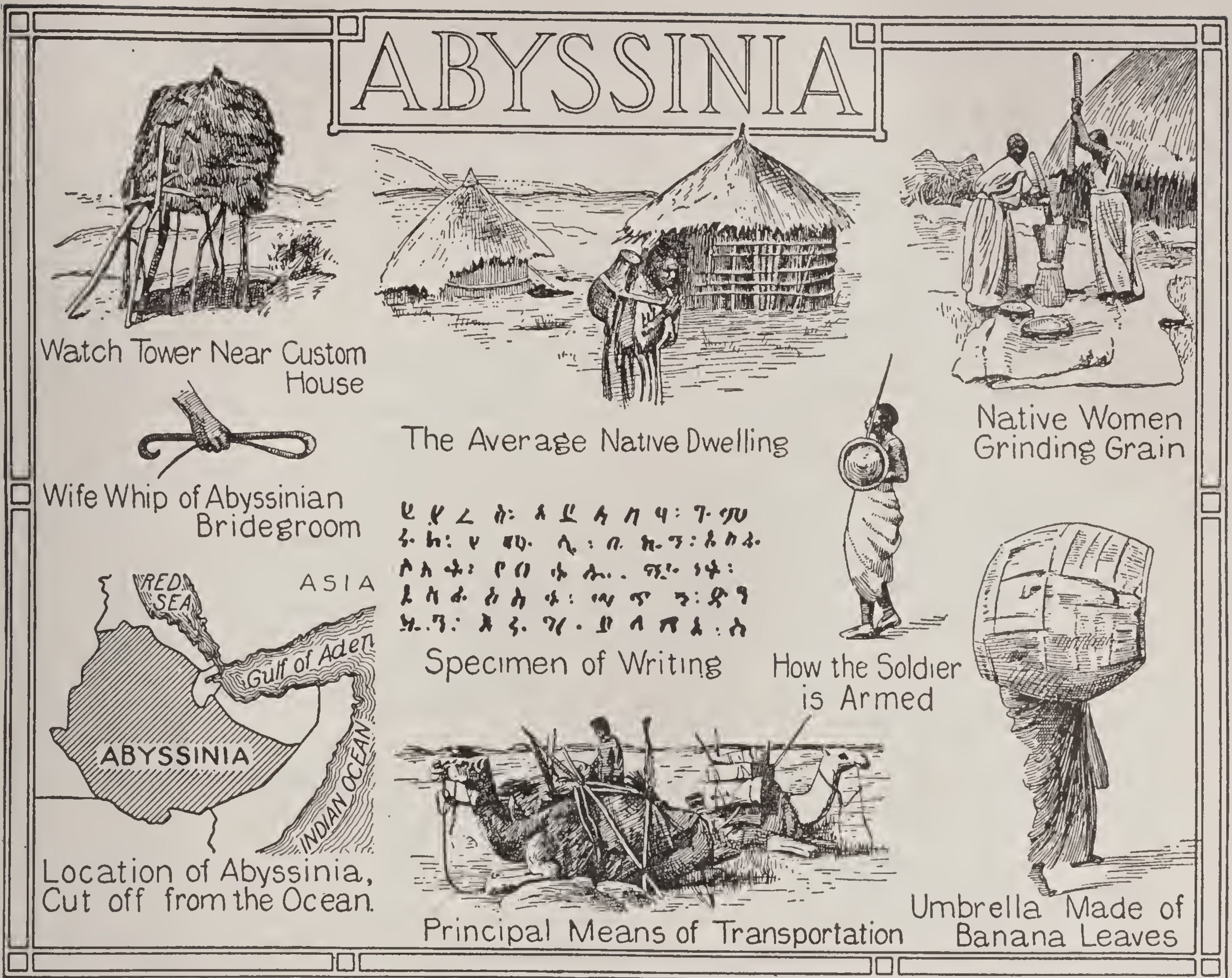
The Country. Abyssinia is the home of about 8,000,000 people, on 350,000 square miles of territory; it is almost twice the size of the combined states of Ohio, Indiana, Illinois, Wisconsin and Michigan, and it is of greater area than Germany and France, together. As its southern extremity is only 250 miles north of the equator, one would expect it to be an exceedingly hot country. This would be true if it were low, but nearly the whole of Abyssinia is a series of high plateaus from 4,500 to 10,000 feet above sea level, so only the valleys are hot, and they are, indeed, very warm. The rainfall is more than plentiful from May to September, which is the wet season; the other half of the year is called the dry season, although even then there is considerable rain.

One usually thinks that the Nile River, to the west in Egypt, receives the immense quantities of water which annually overflow its banks from much farther south in Africa, but a great proportion of this great flood pours westward in many rivers from Abyssiania's highlands. Both countries therefore profit exceedingly from the heavy rainfall. The great differences in altitude make the climate variable and give a great range of vegetable growth.

The People and Their Occupations. The average Abyssinian is dark-brown in color, as would be expected in a race which for thousands of years has lived under equatorial suns. The natives of all classes practise polygamy. The race is descended from the Hamites, the descendants of Ham, who after the Deluge peopled Northern Africa, and also from Arabians, who crossed the narrow strait of Babel-Mandeb. Besides these are modern Arabs, Greeks, Armenians, and a few Europeans. Everything connected with their life is primitive. The average Abyssinian owns nothing of much value; he cannot own land, for theoretically the ruler, called the *negus,* owns every foot of the soil, and the people pay for whatever privileges they enjoy on it. Naturally agriculture is backward among a people who know next to nothing about landed property. Their living is made from coffee growing, which is on the increase, and next in importance, from cotton, sugar, oranges, lemons and dates. On the higher lands wheat and barley are grown, also a large quantity of tobacco.

In its mineral resources Abyssinia is comparatively rich in iron, but it is mined as yet only for local manufacture into knives, spears, axes and the crude implements of the household. General commerce is quite impossible, owing to lack of transportation to the sea. Rubber trees flourish and a good deal of rubber sap is gathered; the methods of its preparation in the locality where it is found are related in the article INDIA RUBBER.

Cities and Communication. The capital city, so called, although it is little more than a group of rude villages built around the palace of the negus, is Addis Abeba. It is 300 miles inland from the sea, and almost inaccessible. The only



means of reaching it is by a narrow winding trail, and mules, horses, donkeys and camels are the means of transportation. There is a railroad from Jibuti, on the French Somaliland coast, south to Harrar, and in time this will penetrate to the capital. Addis Abeba has about 50,000 people, and Harrar is nearly as large. No other town exceeds 5,000. The only native school in the entire country is in the capital city.

There is a telephone line between the two cities above named, and also three other shorter lines. Telegraph lines connect all the principal cities. However, so little information of a reliable nature comes out of Abyssinia that the death of the ruler, Menelik, was reported three times within the year 1913, but not verified until December, when his grandson was known to have ascended the throne.

Government. In theory the hereditary ruler, the *negus negusti* (king of kings) is the supreme authority; his power is short of absolute only as he is swayed by those who must share more or less in governmental control. In the provinces he appoints nominal local heads, unless, as is often the case, leaders not of his choice become strong enough to dispute authority. No serious uprisings have occurred, however, so far as is known. Local authorities collect taxes; these officials use their own discretion as to the amount they may assess, for there is little restriction upon them. There are three principal governmental divisions, the sub-kingdoms of Tigré, Amhara and Shoa; the latter is the most enlightened and consequently the most powerful.

Other Items of Interest. Most of the rich mud with which the Nile makes fertile its valley in Egypt is brought from Abyssinia.

In Abyssinia the soil is so fertile that two and often three crops a year can be produced.

Practically all the large game animals of Africa, the elephant, lion, hippopotamus, rhinoceros, crocodile, leopard, hyena, giraffe and buffalo, are plentiful in Abyssinia.

The year, which begins in September, consists of twelve months of thirty days each. The five, or in leap year, six, extra days are placed at the end of the year and regarded as holidays, for the Abyssinians are very fond of festivities.

The most of the people are still nominal Christians, but their religion has largely degenerated into superstition.

OUTLINE AND QUESTIONS ON ABYSSINIA

Outline

I. Location

(1) Latitude—5° 30′ to 17° N.
(2) Longitude—36° to 42° E.

II. Physical Characteristics

(1) Size
  (a) Comparative
  (b) Absolute
(2) Surface Features
  (a) High plateaus
  (b) Valleys
(3) Drainage
  (a) Nile

III. Climate

(1) Temperature
(2) Rainfall
(3) Arrangement of seasons

IV. Industries

(1) Agriculture
  (a) Primitive methods
  (b) System of land-holding
  (c) Chief crops
    (1) Coffee
    (2) Cotton
    (3) Sugar
    (4) Fruits
(2) Mining
(3) Communications
  (a) Trails
  (b) Railroad
  (c) Telephone
  (d) Telegraph

V. People

(1) Appearance
(2) State of civilization
(3) Elements of population
(4) Cities
  (a) Addis Abeba
  (b) Harrar

VI. Government

(1) Chief ruler—the *negus*
(2) Local heads
(3) Sub-kingdoms

VII. History

(1) Legendary
(2) Authentic
  (a) Contact with Greeks
  (b) Contact with other Europeans
  (c) Present conditions

Questions

Why has Abyssinia no seacoast?
Why is not the country one of the hottest on the globe?
Why are not greater crops produced?
Does Egypt owe anything to Abyssinia?
How does the capital city compare with the capitals of European countries?
What Biblical character does popular tradition connect with Abyssinia?
How does the area compare with that of Texas? Of California? Of Ontario?
On the average, how many people are there to the square mile in Abyssinia?
What is the *negus negusti?*
How is the Abyssinian year divided?
What foodstuff is there which is considered a necessity in North America but is scarcely ever used in Abyssinia?
Why would not the system of land-holding be popular in the United States or Canada?
Would an American or European traveler enjoy a beefsteak dinner in Abyssinia?
What curious fact proves that news from Abyssinia is not always trustworthy?
How do the Abyssinians excuse themselves for begging?
How is the city of Addis Abeba reached from the coast?
What is the native attitude toward marriage?

The name *Abyssinia* means *mixture,* and has reference to the mingling of tribes.

The proudest Abyssinian is not too haughty to beg, for he says "God gave us speech that we might beg."

Though in recent years a standard coin, worth about fifty cents, has been introduced, cartridges and bars of rock salt are still current as money.

Salt is too valuable to be used by any but the wealthy. To say of an ordinary man that he eats salt is to brand him as recklessly extravagant.

Travelers have stated that the steaks most relished by Abyssinians are cut from live cows. When they do not follow this cruel practice they eat the raw flesh of the freshly-killed animal while it is still warm and quivering.

It is a very simple matter to dissolve a marriage, either husband or wife being able to do it with a word.

In 1903 Abyssinia made a treaty of commerce with the United States, and the latter country and Great Britain furnish a large share of the imports.

History. The early history of the country is part of the record of ancient Ethiopia, of which most of the present Abyssinia was a part. The natives yet call themselves Ethiopians. The whole truth cannot be known as to the more ancient period, but besides the Queen of Sheba, referred to above, her son Menelik, whose reputed father was Solomon, probably ruled for a period of years. Whether or not this is true, later kings assumed the name Menelik, the last to bear it dying in 1913. Grecian influences 200 years before the birth of Christ gradually raised the level of intelligence until the people accepted a form of Christian religion in the fourth century A. D.

European nations at various times have looked with envious eyes upon Abyssinian territory. In the sixteenth century Portuguese missionaries entered the country, and it was a more fortunate incident politically than religiously, for the missionaries induced the mother country to help Abyssinia against an invasion of the then very powerful Turks. In 1870 Italy was beginning to look towards Africa for new territory and invaded Abyssinia. The intervention of the British in 1889 saved the country from conditions which would have made it an Italian protectorate if not actually Italian territory.

The Emperor Menelik chose as his successor his young grandson, Jeassu, and the latter succeeded to the throne late in 1913, at the age of seventeen. The youthful ruler proved unsatisfactory to the Abyssinians from the first, partly because he is a confirmed drunkard, but more especially because of his interest in foreign affairs and his desire to introduce into the kingdom Western innovations. Furthermore, the people regarded the selection of Jeassu as a great wrong, for it violated the terms of an agreement made nearly half a century previous, by Menelik and Johannes, king of Tigre, both of whom were then aspirants for the Abyssinian throne.

According to this agreement Menelik was to become emperor, but he was to bequeath the crown to Zeoditu, his daughter by his first wife, and to her husband, Prince Arita, a son of Johannes. In the course of Menelik's reign Prince Arita died and Zeoditu married the nephew of her stepmother, the Empress Taitu. The empress for many years exercised great influence over her husband, and at one time, assisted by her stepdaughter and her nephew, she ruled the country while the nominal ruler lay ill. Her influence, however, waned toward the close of Menelik's reign, and not long before his death the emperor issued a decree changing the order of succession and proclaiming Jeassu as his heir. The dissatisfaction of the Abyssinians culminated in 1916 in the deposition of Jeassu, and his throne is now occupied by the Empress Zeoditu. E.D.F.

ACACIA, *a kay' sha.* The plants which are called by this name differ decidedly in certain ways, for some are delicate shrubs and others great trees, but all have the beautiful feathery leaves which make them favorite ornamental plants, and many have bright-hued, fragrant flowers. Most of the acacias grow only in tropical or subtropical countries, but a few are cultivated in mild climates elsewhere. In the United States the Gulf region and California produce them, and these sections can show few more beautiful plants than an acacia tree covered with its spikes of rose-colored flowers. Most of the acacias grow in Australia and Africa, however, and some of these species, notably the wattle tree of Australia, contain so much of the extract used for tanning that attempts have been made to introduce them into the United States. Some of the African species produce a good quality of gum-arabic and one of the Indian acacias yields the valuable medicine called *catechu.* Like the mimosa, which they greatly resemble in appearance, certain species of acacia have extremely sensitive

leaves. Some of these do not open unless the sun is shining.

ACACIA
Branch and fruit.

ACADEMY, a school or an association for the promotion of literature, science or art. Nearly 2,300 years ago the great Greek philosopher Plato conducted a school in a shady grove a mile from Athens. This grove, according to legend, once belonged to a certain *Academus,* a hero of the Trojan War, and from him Plato's school took its name. The term academy, as now applied to schools, is used mainly in the eastern part of Canada and the United States, where it means a secondary school, primarily to prepare boys for college. Before the development of the high school system, these institutions, usually under the patronage of a church or religious society, afforded the only means of obtaining a secondary education.

Plato's academy, however, was not a school for boys; it was, rather, an association of young men, eager for knowledge, who sought guidance from a great teacher. The word academy, therefore, is also applied to modern associations of men who are engaged in any learned, scientific or artistic pursuits. The most famous of all such academies is the *French Academy,* established by Cardinal Richelieu in 1635. Its object is to obtain a high standard in French language and literature, partly by the example of its members and partly by the ponderous method of preparing the standard French dictionary. This dictionary has gone through many editions, the last in 1878. To be elected a member of the Academy is one of the highest honors a Frenchman can receive, and its members are popularly called the "forty immortals." There are many other noted European academies, including the Royal Academy, of British artists; the British Academy, of historians, jurists, economists, philosophers and philologists; and the Royal Academy of Sciences at Berlin, similar in scope to the British Academy.

American Academies. The first learned academy in America was the American Philosophical Society, founded in Philadelphia in 1743, largely through the influence of Benjamin Franklin. The American Academy of Arts and Sciences was chartered by the state of Massachusetts in 1780, and the Academy of Natural Sciences of Philadelphia was established in 1812. The American Academy of Arts and Letters was founded in 1898, the purpose of its founders being the organization of a body corresponding to the French Academy. The membership is limited to fifty, and the chief qualification for membership is "notable achievement in art, music, or literature." Among its members, past and present, are William Dean Howells, Augustus Saint Gaudens, Samuel L. Clemens, Edward A. McDowell, Henry James, Theodore Roosevelt, Woodrow Wilson, Daniel C. French, Thomas Nelson Page, Joseph Jefferson and Joel Chandler Harris. See AMERICAN ACADEMY OF ARTS AND LETTERS.

ACADIA, *a kay' di a,* the name which the early French settlers gave to the territory now comprising Nova Scotia and New Brunswick, has sentimental and romantic associations that quite overshadow its historic interest. When the French and English began their long and bitter struggle for the possession of the North American continent (see FRENCH AND INDIAN WAR), Acadia was the home of peace-loving French farmers—

> "Men whose lives glided on like rivers that water the woodlands."

During Queen Anne's War (1697-1713), Port Royal, the seat of the Acadian government, surrendered to the English, and when in 1713 the treaty of peace was signed, Acadia was definitely ceded to England. During the years that followed, the Acadians, though nominal subjects of Great Britain, were a source of

much anxiety to the British government because of their sympathy for the French cause, and in 1755 they were commanded to take an unconditional oath of allegiance to the British sovereign. Their refusal to do so was met by an order to leave the country; accordingly about six thousand men, women and children were carried away to the English colonies and scattered at various places from Massachusetts to Georgia. See NOVA SCOTIA.

This melancholy chapter in the history of the Acadians has been treated poetically in Longfellow's well-loved epic *Evangeline,* a poem which will preserve the name of Acadia as long as there are readers to appreciate its pathos and its beauty (see EVANGELINE). Interest in the tale centers about the sweet and loyal heroine, whose faithfulness to her lover is the theme of the poem. The author has expressed this fidelity in the familiar lines—

Ye who believe in affection that hopes, and endures, and is patient,
Ye who believe in the beauty and strength of woman's devotion,
List to the mournful tradition still sung by the pines of the forest;
List to a tale of love in Acadie, home of the happy.

ACADIA UNIVERSITY, an institution for higher education, at Wolfville, N. S. It was founded in 1838 by the Nova Scotia Baptist Education Society, received a charter in the next year, and adopted the name Acadia College in 1841. The name was changed to Acadia University in 1891. The board of governors of the university is chosen at the annual Baptist convention of the Maritime Provinces, and the board must report to the convention. Two courses of study, leading to the degrees of B. A. and B. S., are offered. The faculty comprises thirty professors and instructors, and there are about 500 students. In affiliation with the university are the Acadia Seminary for Young Ladies and Horton Academy, a boy's preparatory school.

ACANTHUS, *a kan' thuss,* an order of plants or shrubs, most of which are but ordinary weeds, although several species form beautiful garden and hothouse plants. These latter, with their large, white flowers and deeply-indented shining leaves, are tropical in habit, and will grow in the United States and lower Canada only if carefully protected.

In architecture the name is given to a kind of foliage decoration, much employed in Greek and Roman times, and later. The conventionalized form is the characteristic decoration of the capital in the Corinthian column, the richest and most ornamental type of Grecian architecture. See COLUMN.

ACANTHUS

The plant, the conventionalized design adopted in architecture, and an example of its use in a column.

ACAPULCO, *ah ka pool' ko,* a seaport of Mexico, 200 miles southwest of the City of Mexico, has a better harbor than any other port on the entire Pacific coast of America. In spite of this advantage the town is of little commercial importance, for the extremely hot and unhealthy climate and the frequent earthquakes of the region have been heavy drawbacks. The city was, in fact, almost wholly destroyed by an earthquake in 1909. The exports, most of which are sent to San Francisco, include cochineal, fruit, timber, wool, hides and indigo. During the time of the Spanish ascendancy in Mexico, Acapulco was an important port and had an extensive commerce, but since Mexico obtained independence, in 1821, its trade has diminished. In time it will profit from new trade routes opened as the result of the completion of the Panama Canal. The population is about 6,000.

ACCENT, *ack' sent.* When a word of more than one syllable is pronounced, one syllable is made more prominent than the others by means of special emphasis. This emphasis is called *accent,* and is indicated when words are being spelled to show their exact pronunciation, by the sign ′, placed after the stressed syllable. Some long words have more than one accent—in the word *examination,* for example, the syllables *am* and *na* receive more emphasis than the others. But there is always one accent which is stronger than the others, and this is known as the *primary* accent. In the word referred to above, *na* has the primary accent, that on *am* being *secondary.* Such a secondary stress is indicated by two marks, ″, or by one which is lighter than the primary accent mark. Frequently, no one can say just why, accents shift, and there is at present a tendency in English to place the accent as near

the beginning of the word as ease of pronunciation will permit. The word *peremptory,* for instance, until a few years ago was accented on the second syllable, but to-day authorities agree on the pronunciation *per'emptory.*

The term is commonly used in music also, to indicate the stress which is placed on certain tones. Normally, the first beat of each measure receives such an emphasis, and if the measure be long, one or more weaker or secondary accents may be used later. In a 9/8 measure, for example, the first beat is stressed strongly, but weaker accents are placed on the fourth and seventh beats. Sometimes, in order to produce a certain peculiar effect, the accent is shifted and allowed to fall on a beat which would regularly be unaccented. This shifted accent is the most marked characteristic of "ragtime" music. See MUSIC.

ACCESSORY, *ack ses' o ri,* or **ACCESSARY,** in law, is a person who has some part in the perpetration of a crime, either before or after its commission, but who is not present when the unlawful act is performed. One who aids prior to the act, or who has knowledge that it is impending and does nothing to prevent it, is an *accessory before the fact;* if he aids the active agent after the crime is committed, or has knowledge of it which he suppresses, he is an *accessory after the fact.*

An accessory is punishable with penalties which may be as heavy, in the discretion of the court, as those visited upon the one who actually commits the offense. A knowledge of facts with which a law-abiding citizen accidentally becomes familiar places an obligation upon him to assist in punishing law-breakers.

In physiology, accessory muscles are those that control the finer movements of the body, as the fingers, the toes, and the tongue in making consonantal sounds.

ACCLIMATIZA'TION, or **ACCLIMA'TION,** the process by which a plant or animal adapts itself to a climate to which it is not accustomed. The best examples of acclimatization are the cultivated plants, like the potato, wheat, barley and other cereals, and the common fruits; all of these are believed to have grown originally only in the warmer zones, but now flourish almost to the polar regions. Although in most of these acclimatization seems perfected, yet certain limitations are always appearing; for instance, corn cannot be grown in the short, cool seasons of the northern temperate regions, while some kinds of wheat do not thrive as well in the warmer climates. There are countless instances of partial acclimatization, where the plant may grow thriftily for a time but fail to mature fruit or to bear seeds.

Animals vary considerably in their power to adapt themselves to different climates. Some, such as the dog, the cat, the domestic fowls and mice, have followed man into all parts of the world and seem to thrive wherever man does. In general, it is true that any animal organism may adapt itself perfectly to new conditions if they are presented slowly and by degrees, while if thrown suddenly among the same conditions it will die. Change in climate sometimes affects neither vigor nor general health, but merely size, as in the case of the Shetland pony. Man himself possesses great adapability, yet when changes occur suddenly, he may fall prey to fatal diseases. Whenever representatives of the races inhabiting the temperate climates are transported to the tropics, they find it difficult to preserve health and vigor for any great length of time. Of all races of men the Anglo-Teutonic seems best able to endure changes in climate; this ability has made it the greatest colonizing race of the world. Modern sanitation and intelligent care, however, enable people to live for many years in varying climates, preserve their health and even carry on the industries of their first home.

W.F.Z.

ACCORDION, *ack kawr' di on,* an old-fashioned wind instrument, one of the smallest of such devices, consisting of a bellows of many folds, to which a keyboard is attached. The right hand plays the melody by pressing the keys, while the left hand opens and shuts the bellows, which causes the air to pass over a set of metal reeds, thus producing the musical sounds. The accordion is easy to play, and its music is favored at barn and country dances. It was invented in Vienna in 1829, but is similar to a wind instrument used by the Chinese for centuries. See CONCERTINA.

ACCORDION

ACCOUNTING is the science of discovering and displaying by means of accounts the exact state of affairs in any business which has to do in any way with money or property. It is thus

distinct from bookkeeping, which records facts by rules laid down by accounting and for accounting to interpret. The relation of an accountant to a bookkeeper is somewhat the same as that of a mechanical engineer to a mechanic; the first designs machines, the second constructs and uses them, and the first again studies to see if improvements or corrections are necessary. A good bookkeeper will be to some extent an accountant, just as a good mechanic knows something of engineering practice. See BOOKKEEPING.

Accounting, like commercial law, is a subject of which every business man should have some knowledge. Good bookkeeping, by indicating weaknesses in the structure of a business, may save even a small concern thousands of dollars, but unless the proprietor knows how to make his accounts vital he is apt to have poor bookkeeping. The head of a large establishment, though he is able to hire accountants to supervise his books, will not have the ability, unless he has an understanding of accounting, to read the full story which the books tell.

Accountants. Those who practice accounting (or accountancy, as it is called in England) are of two sorts, private and public. The former give all their time to directing the accounts of one organization. The latter are at the service of all people. Their activities are of three sorts: (1) auditing or examining accounts to discover if they have been correctly kept, or to give an impartial report upon the affairs of a company; (2) advising what accounts are appropriate for a particular business; (3) in the British Empire, acting as trustees, executors or administrators.

A public accountant has one of the most responsible positions in the business world. If he is hired by the directors of a corporation to audit its books he must not only look for errors on the part of the bookkeepers but also discover if the directors themselves, by accident or intention, are deceiving the stockholders and creditors with false reports. In a certain instance an accountant examined the books of a small corporation and certified that they were correct. The company had apparently made a handsome profit on the past year's business, and through public faith in the accountant's report it was able to borrow money. Only a few months later it failed. The discovery was then made that instead of earning money the company had been losing. Through the incompetence of an accountant a number of people had lost their savings.

To guard against such wrongs most of the states of the American Union and the Canadian provinces have followed Great Britain in requiring public accountants to pass examinations. A Certified Public Accountant in the United States or a Chartered Accountant in Canada is one who has shown by examination to possess not only a knowledge of bookkeeping principles but of finance, commercial procedure and law. In some states and provinces he must have a high school education or its equivalent.

To be a successful public accountant a man should have a liking for analysis and for thoroughness and possess the consciousness that his responsibility requires not only honesty but constant alertness.

Cost Accounting. Accountants have saved the world millions of dollars by discovering and preventing waste. The purpose of cost accounting is to assign to each section of a business its proper and full share of expense. In figuring the cost of manufacturing an article, for instance, not only such direct costs as the material consumed must be charged to it, but also a portion of the *overhead* expense, and indirect costs like interest and insurance on the stock and the wear and tear on the machines which make the article. By *overhead* expense is meant that which goes on all the time whether the machines are active or idle; salaries of administrative officers and rent of buildings are examples of it.

Without the help of cost accounting a business may continue for years losing money on supposedly profitable undertakings. The investigations of the United States Department of Agriculture are proving this particularly true in the case of farming.

Farm Accounting. The following is a brief outline of a method of determining the exact cost of any crop on the farm, and also illustrates the principles of cost accounting for any business. It is based on the recommendations of the United States government and will be better understood if read in connection with the article BOOKKEEPING, especially the section called *Farm Bookkeeping.*

Each crop must be charged with:

(1) Items which enter directly into its cost, such as seed, insect destroying chemicals and fertilizer, whether they are products of the farm or purchases.

(2) Labor of men. If the number of hours spent on each task is noted every day, and at the end of the year the total cost of labor (including a reasonable salary for the farmer) is divided by the number of hours which have been spent, the

result will be the cost per hour. Of course two men working one hour must be counted as one man working two hours.

(3) Labor of horses. The expenses of the horse account will include feed, a reasonable charge for space in the barn, and man-labor for their care. If they are worth less at the end of the year than at the beginning the difference is charged to the account. A year's interest on their value, and insurance and taxes on them, if any, are added. The account is credited for manure produced. The total cost of the horses for the year divided by the number of hours of work will give the cost per hour.

(4) Machinery, equipment and harness use. The cost of this account for the year is found as in the case of horses by charging materials, labor, interest, rent, insurance, depreciation and taxes. It is important to charge adequate *depreciation,* or decrease in value. The number of hours by which the total is divided should not include hours in which equipment was employed for the benefit of other equipment, as for instance when harness and wagon are used in bringing new machinery to the farm.

(5) Rent, hail insurance, depreciation and taxes on the land used (in proportion to its fertility), and a share of the like costs for buildings and fences on the farm. C.H.H.

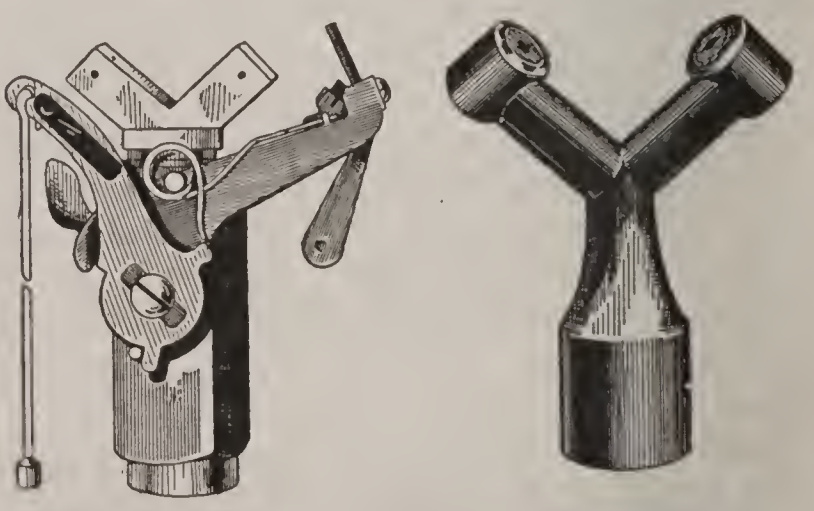
ACETANILID, *as et an' e lid,* a highly poisonous drug, frequently given as a medicine because it has the effect of deadening pain. Its presence in numerous headache powders and tablets is a source of great danger (see HEADACHE). Such remedies should be avoided, as large doses of acetanilid have in many instances proved fatal. It is a white, crystalline powder, and is made by treating aniline with acetic acid. J.F.S.

ACETIC ACID, *a set' ic* (or *a seet' ic*), in its pure and water-free state, is a colorless liquid, a little heavier than water. It has a very sharp odor and a painful action upon the nose and eyes. It is a caustic, that is to say, a substance which acts upon the skin, producing severe burns. When cooled to 62° F. (the temperature of a cool room), pure acetic acid solidifies into ice-like crystals. For this reason pure acetic acid (even when liquid) is called glacial acetic acid. Dilute acetic acid, that is, acetic acid mixed with water, is cheaper than the glacial acid. Druggists keep solutions of six and of thirty-six per strength.

Acetic acid takes its name from the Latin *acetum,* meaning *vinegar.* It is this acid to which the sourness of vinegar is due. The interesting process by which acetic acid is formed from dilute alcohol is described under the title VINEGAR. Vinegar contains only from four to eight per cent of acetic acid. Concentrated acetic acid was first obtained from vinegar in the year 1700 by the German chemist Stahl. Today it is made commercially from hardwood by distillation, being thus a by-product of the manufacture of charcoal (which see) and wood alcohol. The crude acid first obtained is called *pyroligneous* acid (from the Greek *pur,* meaning *fire,* and the Latin *lignum,* meaning *wood*). This crude acid is used to some extent in dyeing. The greater amount, however, is converted into pure dilute acetic acid.

Acetic acid is used extensively in the manufacture of *white lead, acetone* and the *acetates.* Among the important acetates are those of lead, calcium, sodium, copper, aluminum and iron. Lead acetate is *sugar of lead. Verdigris* is a copper acetate used in the manufacture of *Paris green.* The acetates of sodium, aluminum and iron are used in dyeing. J.F.S.

ACETYLENE, *a set' i leen,* a clear, colorless gas, of great commercial importance for lighting purposes. It ignites easily, and burns with a bright but smoky flame. Ordinarily the



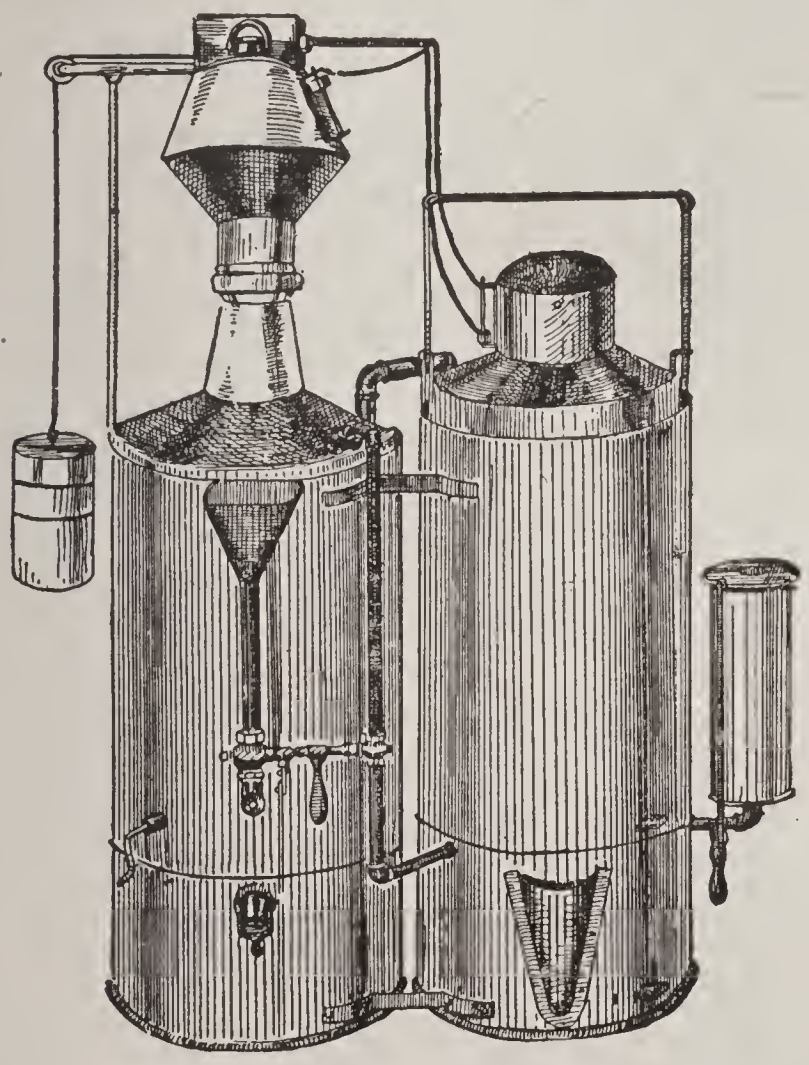
TWO TYPES OF ACETYLENE BURNER

gas has a peculiar odor, somewhat like that of garlic, but when it is burning has no odor. It was once largely used for automobile and bicycle lamps, and is now much employed in illuminating country houses. Acetylene gas was formerly regarded as dangerous, but as a matter of fact it is less poisonous than ordinary illuminating gas, and, if handled with reasonable care, is not more likely to explode. The smoke of the acetylene flame is eliminated by using a special burner, constructed on the principle shown in the accompanying illustration. There are two small openings, from which the gas issues and mingles with the air. The acetylene burners used in house-lighting consume about seven-tenths of a cubic foot per hour, and give a light of about twenty candle power. The cost of this light is about three-fourths that of ordinary illuminating gas.

Manufacture of Acetylene Gas. The cheapness of this gas is due chiefly to the simplicity of its manufacture. Chemically it is composed

of carbon and hydrogen, and it is produced by the action of water on calcium carbide. When calcium carbide is placed in contact with water, the hydrogen of the water unites with the carbon of the calcium carbide to form acetylene gas. A pound of commercial calcium carbide yields about 4.5 cubic feet of acetylene gas. Calcium carbide can now be purchased by consumers, who are enabled to make illuminating gas on their own premises. A reservoir to contain the calcium carbide, another for water, and an arrangement for mixing the two are the only requirements.

Manufacture of Calcium Carbide. Calcium carbide, as now used for commercial purposes, is the product of the electrical fusion of coal dust and lime in the proportion of one pound of coal dust to 1.5486 pounds of lime. The result of the fusion of this quantity is 1.77 pounds of a dark gray, cinder-like substance. The lumps of this substance, which is called carbide of calcium or calcium carbide, are brittle and crystalline. At first they have a lustrous surface, but after a short exposure to air

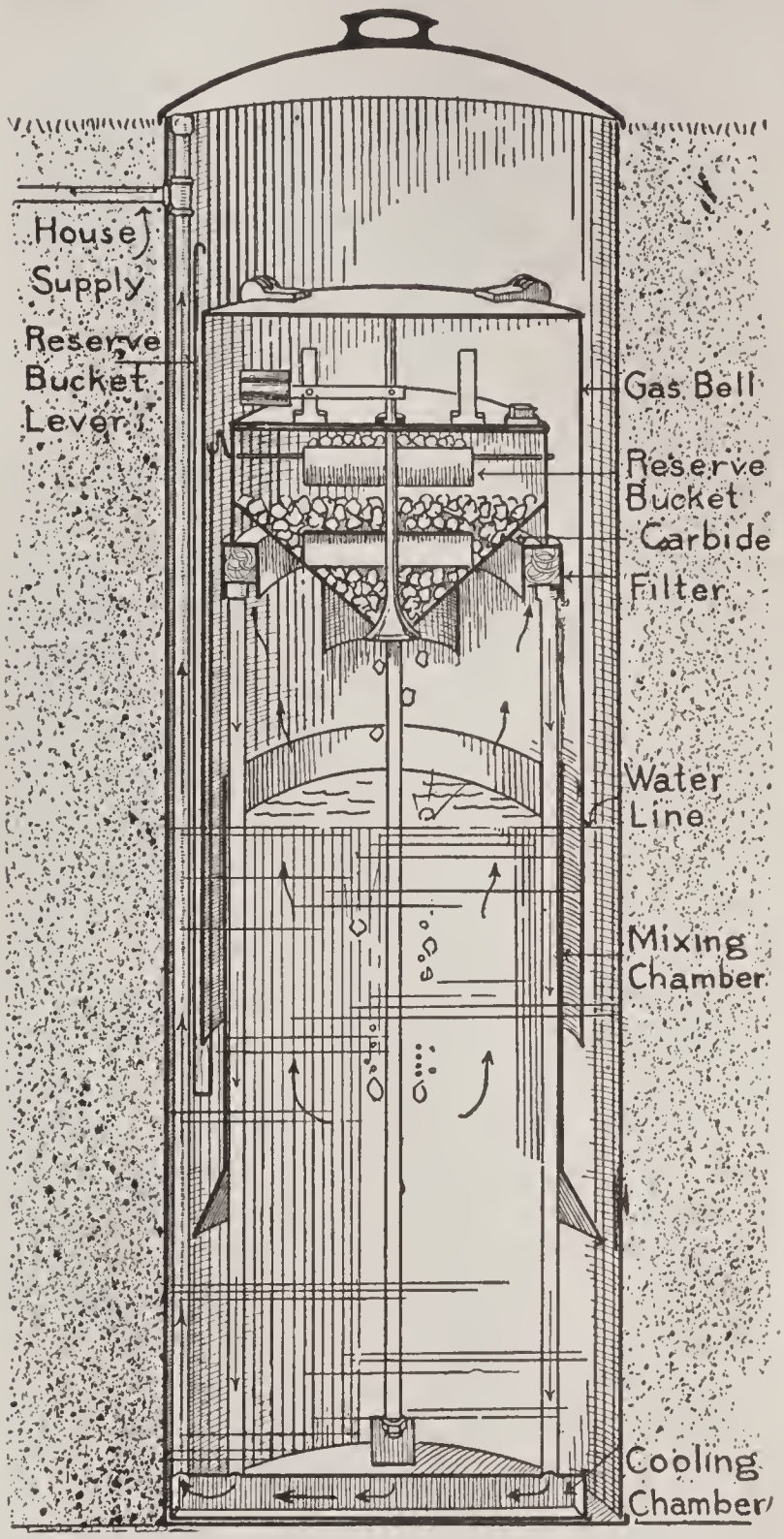


ACETYLENE GENERATOR

A plant of small size is sufficient for the ordinary residence.

they become tarnished. The present method of manufacture was perfected about 1892 by Thomas L. Willson, a Canadian scientist.

Acetylene Welders and Cutters. The flame of acetylene gas, when burning in pure oxygen, is even hotter than that of hydrogen burning in oxygen (see HYDROGEN). The oxy-acetylene flame, that is, acetylene burning in



Cross-section of underground tank for supplying acetylene gas to a residence requiring a large number of lights. Besides the house, such a tank will generate sufficient gas to supply the barn and other outbuildings. Plants of this nature are becoming popular in rural communities, where electric light or illuminating gas is not available.

oxygen, has been found well adapted to the purpose of welding metals. It is also extensively used, in a torch which concentrates the flame, for cutting or burning through metal. A thin thread-like flame is directed at the point where the cut is wanted, and burns its way through the hardest metals as though they were cut by a saw. J.F.S.

Consult Leeds' *Acetylene—the Principles of Its Generation and Use;* Lewes's *Acetylene—a Handbook for the Student and Manufacturer.*

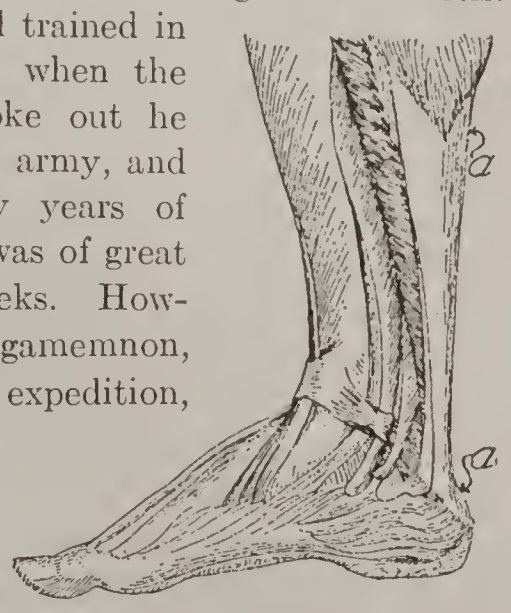
ACHAEANS, *a kee' anz,* the early inhabitants of Southeastern Thessaly and a part of

Peloponnesus, who formed one of the four groups of ancient Greeks. After the Dorian invasion they pushed into Northwestern Greece, where they formed the *Achaean League,* a confederation of the twelve towns of that region. The power of the League waned after the death of Alexander the Great. It was revived in 280 B.C. and later spread over the whole of Greece, lasting until 146 B.C., when it was destroyed by the Romans. The term Achaia, or Achaea, was used by Horace to designate the whole of Greece. The Achaeans received their name from their mythological ancestor, Achaeus, the grandson of Hellen. See GREECE.

ACHATES, *a ka' teez,* one of the Trojans who followed Aeneas and remained with him through all his wanderings and his struggles after the hurried flight from Troy (see TROY). He was so devoted to Aeneas and so constant that he was always called *fidus* (faithful), and the expression *fidus Achates* has come to be a common one for a very faithful friend. Scott used the term in the sentence, "He has chosen this fellow for his *fidus Achates.*"

ACHERON, *ak' e ron,* the name applied in ancient times to a number of rivers in Greece and Italy. In Homer's epics there is mention of a river in the underworld by the name of Acheron; the poet is said to have taken the name from that of a river in Epirus which flows into the Ionian Sea. In later mythology Acheron is the name of a river or lake in Pluto's realm, across which Charon ferried the souls of the departed. See CHARON; PLUTO.

ACHILLES, *a kil' eez.* The *Iliad* opens with an account of the wrath of this great Greek hero—"ruinous wrath, which laid unnumbered woes on the Grecians." He was the son of Peleus and the sea-goddess Thetis. Having been well trained in the arts of war, when the Trojan War broke out he joined the Greek army, and during the early years of that struggle he was of great help to the Greeks. However, when Agamemnon, leader of the expedition, took from him Briseis, a captive maiden, he refused to have anything further to do with the war, and the Greeks soon were in desperate straits. Only the death of his beloved friend and kinsman Patroclus made Achilles forget his personal grievances. Filled with the desire for revenge, he rejoined his warring countrymen and turned the tide of their fortunes by slaying Hector, the bravest of the Trojans. According to the early myth-writers Achilles had been dipped by his mother in the Styx, which made invulnerable every part of his body except his heel, by which she held him. His death-wound, made by an arrow, he received in this heel. See HECTOR; TROY; ILIAD.



TENDON OF ACHILLES
Shown at *a*

Tendon of Achilles. Because it was by the heel that this great Greek hero was held, the strong tendon which connects the muscles of the calf with the heel is known as the *tendon of Achilles.* It may be easily felt just above the heel. F.J.C.

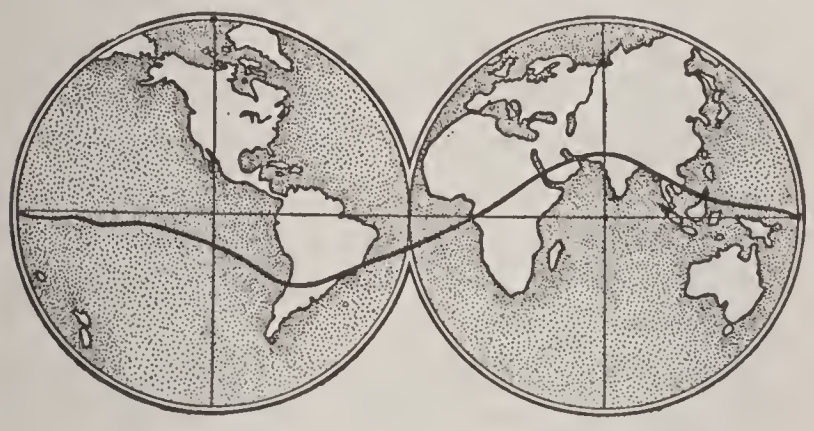
ACID, *as' id,* a name applied to a number of chemical compounds, having more or less the qualities of vinegar. The general properties assigned to them are a tart, sour taste, the power of changing a vegetable blue called *litmus* into red, of acting upon and dissolving metals and of being rendered neutral by alkalies (see ALKALI).

Blue litmus is made from a kind of lichen which grows on the seacoasts of Europe. It is supposed that the change from blue to red which the litmus undergoes when treated with an acid is due to a change in the relative position of the atoms in one of the chemical compounds contained in the litmus. An acid always contains hydrogen, and it is always possible to take the hydrogen from an acid and replace it with a metal, with the result that what is known chemically as a *salt* is produced. An instance of a hydrogen compound that is not an acid is water, which is composed of hydrogen and oxygen. However, when hydrogen and chlorine combine, the product is an acid, *hydrochloric acid;* for the hydrogen can be replaced by such a metal as sodium, and *sodium chloride* is produced. The latter happens to be what every child knows as common salt.

Many acids are harmless if taken internally, while others, themselves compounds of elements that cannot do harm, are deadly poisons. When we eat oranges or lemons we swallow citric acid. Grapes contain tartaric acid; apples, malic acid; and vinegar, acetic acid. All of these are harmless, but oxalic acid and carbolic acid, although made up of the same elements as the others—namely, carbon, hydro-

gen and oxygen—are deadly poisons. Sulphuric acid, nitric acid and hydrochloric acid are manufactured on a large scale, and are very useful products in manufactures and elsewhere; some of their uses are related in detail in this work in articles bearing those titles. See CHEMISTRY; HYDROGEN; LITMUS; ACETIC ACID; CITRIC ACID; CARBOLIC ACID; NITRIC ACID; SULPHURIC ACID. J.F.S.

ACLINIC, *a klin' ic,* **LINE,** or the magnetic equator, an imaginary irregular curved line circling the earth in the neighborhood of the



ACLINIC LINE

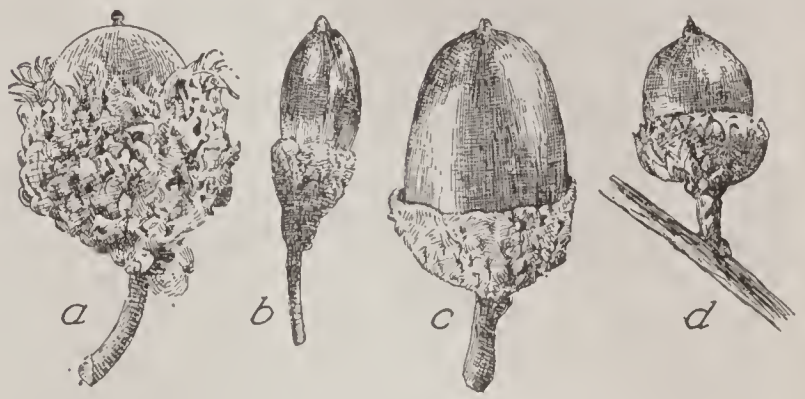
geographical equator. This line marks the zero point, or perfect balance, in magnetic attraction between the north and south magnetic poles. At all points along this line the magnetic needle always will balance itself horizontally, having no dip. See DIPPING NEEDLE; MAGNETISM.

ACONCAGUA, *ah kon' kah gua,* an extinct, craterless volcano in Argentina, in the southern part of the Andes Mountains. It is the highest mountain in America, its height being between 23,000 and 24,000 feet. A river of the same name, 200 miles in length, rises on the southern slope of the mountain and enters the Pacific Ocean twelve miles north of Valparaiso, Chile.

ACONITE, *ack' o nite,* a group of hardy plants of the buttercup family, consisting of about sixty species, all of which are poisonous. Powerful medicines are made from their roots and leaves. Applied to the skin, these cause a feeling of numbness, and are used to deaden pain in some forms of rheumatism and neuralgia. If taken internally they cause the heart to beat more slowly, and too large a dose kills by stopping the heart action.

Well-known examples of aconite plants are wolf's-vane and monk's-hood. The blue or yellow flowers of these plants bear sepals of unequal size and shape, the upper one having the form of a helmet or hood. J.F.S.

ACORN, *a' korn* or *a' kern,* the fruit of the oak tree, consisting of a rounded nut covered by a woody cup. The inhabitants of some countries use acorns for food. Squirrels and many birds, especially the jay, store them away



VARIETIES OF ACORNS

a—Bur oak
b—Live oak
c—Chestnut oak
d—Red oak

as food for the winter, and many oaks have grown from the acorns dropped by these little harvesters. Such expressions as "Mighty oaks from little acorns grow" are often used as figures of speech to show what may result from small beginnings. The tree is described under the title OAK.

ACOUSTICS, *a kow' stiks* or *a koo' stiks,* from a Greek word meaning *to hear,* is a term applied to that quality of a room or hall which determines how easily sounds produced in it may be heard. A room containing large, smooth surfaces on the walls, floor or ceiling is said to have bad acoustic quality, because these surfaces reflect successive sound waves sent out by a speaker's voice, so that the words overlap and confusion results (see ECHO). The most remarkable example of the acoustic properties of a large room is to be found in the Mormon Tabernacle at Salt Lake City, Utah, where a whisper can be heard distinctly in all parts of the room. See SOUND.

ACRE, *ah' kur* or *a' kur,* or **AKKA,** a city and seaport of Syria, at the foot of Mount Carmel. In medieval times it was a place of great importance, being the key to the Holy Land, and in consequence it is famous for many sieges. In 1104 it was taken by the Crusaders (see CRUSADES). In 1187 the Saracens recaptured it, but it was recovered by Richard Coeur de Leon, who gave it to the Knights of Saint John of Jerusalem. In 1291 it was again taken by the Saracens. Napoleon attempted unsuccessfully to take Acre in 1799, when he was approaching the years of his wonderful career.

ACRE, *a' ker,* a measure of land consisting of 160 square rods, or 4,840 square yards. In the English system a square of land 208.7 feet in each direction is equivalent to an acre; in the metric system (which see) one hectare is equal to 2.471 acres. The acre is used as a

measure in the United States, Canada and England.

In terms that a city child will grasp quickly, an acre of land is contained in nearly fourteen city lots each 25x125 feet.

ACROP'OLIS, in ancient Greece, the fortified or religious center of a city. The word is a compound of *akros,* meaning *highest,* and *polis,* meaning *city.* Originally the acropolis was the highest point in a district. Some hill or other easily fortified height was selected as a place of refuge and fortifications were usually added; here the chief of a tribe lived. In time it reached the importance of small settlements, and finally cities appeared at the foot of the acropolis. When people began to fortify the city, it was no longer necessary to preserve the acropolis as a fortress, and it became customary to erect there the temples of the most sacred cults. The acropolis at Athens, which is the best example of this change, contained some of the most beautiful buildings in the world. Among them were the Parthenon, Erechtheum, Temple of Nike Apteros, Propylaea and Theseum, all described in these volumes. For further details, see ATHENS.

ACROS'TIC, as generally used, means a poem of which the first letters of the lines, taken in order, spell some name or other common word, or even a motto or a sentence. Strictly speaking, the content of the verse should deal with the subject given in these initial letters; if it does not the acrostic is faulty and loses its chief charm. The following is a simple example:

Vying with the arbutus for modesty and grace,
Innocent as gleeful smiles on happy childhood's face—
Other flowers demand our love and entrance to our thought—
Love seeks her in her hiding place and spends itself unsought.
Early springtime blossom in your modest garb of blue,
Think not that summer's gorgeous bloom can steal our love from you.

Many acrostics are far more elaborate than this, for some form words with their last as well as their first letters, or have some name "running down like a seam through the middle." Formerly the making of these was a popular pastime, and poets of note did not hesitate to try their hand at it, but acrostics have never stood high in the poetic scale and to-day no real poet wastes his time upon them. For the most part they have been banished to the puzzle department of magazines. In Hebrew poetry the name acrostic was given to a poem of which the initial letters of the lines or stanza gave the names of letters of the alphabet in their order. The most noted of such poems is *Psalm* CXIX, of which the verses of the first division all begin with the first letter of the alphabet, those of the second with the second letter, and so on until all the letters have been used.

ACTAEON, *ak' tee on,* according to Greek mythology a great hunter and a worshiper of the goddess Diana. Having by chance come upon the virgin goddess while she was bathing, for his boldness he was changed by her into a stag, despite his protests of innocence. His dogs, not recognizing him, set upon him and tore him to pieces.

ACTAEON AND HIS DOGS

From a statue standing in the British Museum, London.

ACTIUM, *ak' shium,* (now **AKRI**), a promontory on the coast of Greece, dividing the Gulf of Arta from the Ionian Sea. It is famed in history as the scene of a great naval battle, in 31 B.C., in which Octavian, later known as Augustus Caesar, gained a victory over Antony and Cleopatra. Cleopatra's fleet was being held in reserve and had not been engaged in battle, when an unexpected manœuver of Octavian made his victory probable. The queen, instead of coming to Antony's aid, ordered her ships to flee. Thereupon Antony himself deserted his fleet and followed her. The leaderless fleet fought

bravely, but was finally overcome. See Antony; Cleopatra.

ACTON, John Emerich Edward Dalberg, first Baron Acton (1834-1902), the most prominent Roman Catholic layman in England during the nineteenth century, and a distinguished historian. He was born in Naples, was educated under Cardinal Newman and at the University of Munich, for, being a Roman Catholic, he could not then obtain a degree at Cambridge. He traveled extensively, but at the age of twenty-five settled in England and became a follower of Gladstone. As a liberal Roman Catholic and as editor of *The Rambler,* one of the most brilliant publications of the time, he offended many of the more conservative among the Catholic party. Entering Parliament, he served until 1865 and was raised to the peerage in 1869. In 1892 he was appointed Regius Professor of Modern History at Cambridge University, where he planned, and partly edited, the *Cambridge Modern History,* in ten large volumes. His library of 80,000 volumes was purchased by Andrew Carnegie and afterwards was given to Viscount Morley, who presented it to Cambridge University.

ACTS OF THE APOSTLES, the fifth book of the New Testament, written by Luke to form a sequel to his Gospel. In it he gives a history of the foundation and growth of the Christian Church from its small beginning in Judea on the Day of Pentecost up to the time when Paul introduced it into Asia Minor, Greece and Rome. He describes the persecution of the Jews as the Church grew in size, until they fled from Judea into Samaria and Syria, taking their new religion with them and spreading it. Later the church at Antioch grew to be the headquarters from which Paul worked into the wider field.

ADAM AND EVE. In the Biblical story of the Creation, recounted in the book of *Genesis,* it is told that God created as the first parents of the human race two beings who were called Adam and Eve. In this narrative Eve was created as a helpmate for Adam, out of one of his ribs, and the two lived in the beautiful Garden of Eden to keep guard over it. Tempted by the Evil One, in the form of a serpent, to eat of the forbidden "tree of knowledge of good and evil," they fell from grace and were driven by the Lord from the Garden. Adam is recorded as dying at the age of 930, leaving numerous descendants; there is not the slightest evidence as to the age of Eve at her death. Among the sons of Adam and Eve, Cain, Abel and Seth are specifically mentioned. See Cain; Abel.

ADAMS, Charles Francis (1807-1886), an American diplomat and political leader, who, as minister to Great Britain from 1861 to 1868, earned for himself a place in American diplomacy second only to that of Benjamin Franklin. Largely through his efforts Great Britain and France refrained from giving active recognition and aid to the Confederate states. He was born in Boston, but his boyhood was spent in Russia and England, where his father, John Quincy Adams, was United States minister. Only a few years after his graduation from Harvard College in 1825, he was the recognized leader of the New England Whigs and in 1848 was nominated by the Free Soil party for Vice-President on the ticket with Martin Van Buren, but defeated for election. In 1871 he represented the United States in the settlement of the Alabama Claims (see Alabama, The), and in the next year he took a leading part in organizing the Liberal Republicans.

ADAMS, Charles Kendall (1835-1902), an American educator and historian, who introduced into the United States from Germany a new method of studying history, known as the *seminar,* or *seminary,* by which the students do original research work along special lines. He was born at Derby, Vt., and was educated at the University of Michigan and in Germany, France and Italy. In 1869-1870 he established at the University of Michigan the first American historical seminar. Between 1885 and 1902 he was at the head of two great universities, serving as president of Cornell from 1885 to 1892, and as president of the University of Wisconsin from 1893 until shortly before his death. He was the chief editor of *Johnson's Universal Cyclopedia,* and the author of several books, most important of which is *A Manual of Historical Literature.*

ADAMS, Frank Dawson (1859-), a Canadian geologist and educator, known especially for his researches on metamorphism and the older crystalline rocks of the earth. He was born at Montreal, where he attended the high school and McGill University; later he studied at Yale University and at Heidelberg, Germany, where in 1892 he received the degree of Doctor of Philosophy. He was appointed professor of geology at McGill University in 1893, and became dean of the faculty of applied science in 1908. Dean Adams has published numerous special reports on the geology of Canada.

ADAMS, JOHN (1735-1826), second President of the United States and one of the foremost of that group of American statesmen who gave themselves in full devotion to the cause of independence and the upbuilding of the new nation. The impress which he left on his country is the more remarkable because he was personally not popular. He was noticeably lacking in the magnetic qualities which made his second cousin, Samuel Adams, an admired leader. John Adams was a brilliant constitutional lawyer, he possessed great moral courage, he was devoted with all his soul to the cause of the colonies. On the other hand, he was nervous, impetuous, generally tactless, vain of his ability, and he was inclined to think overwell of his own opinions.

His friends, his enemies and the people at large did not allow these faults to outweigh his real merits. A weaker man than he would have been ruined by his stand in 1770, when he felt it his duty to defend the British soldiers who were being tried for murder (see BOSTON MASSACRE), but in the very same year he was elected to the colonial legislature. Many years later, as President, he gave another example of courage when he determined, at all costs, to preserve peace with France. His policy made him probably the most disliked man in the United States; yet he himself felt that this was the greatest service he had ever rendered to his country and he desired "no other inscription over my grave than this: 'Here lies John Adams, who took upon himself the responsibility of the peace with France in 1800.'"

His Public Career. John Adams was born at Quincy, Mass., on October 31, 1735. His Puritan great-grandfather had left Devonshire, England, in 1636 and had settled on a forty-acre tract on the site of the town of Quincy. The Adams family prospered, although its members never pretended to be anything but hard-working farmers. It was the family custom to send the sons to Harvard College, from which the future President was graduated in 1755. He stood fourteenth in a class of twenty-four; in those days the ranking indicated not scholarship but social position. The Adams family seemed to think that he should study for the ministry, but John was too liberal for the pulpit of his day and preferred the law. In 1758, being then twenty-three years old, he began to practice in Braintree, but ten years later moved to Boston. In the meantime he had married Abigail Smith, a woman of great charm and ability, who gave him courage and advice at every critical point in his life (see subhead below, *Abigail Smith Adams*).

Shortly after his marriage he began to appear in public affairs. When the Stamp Act of 1765 was passed he presented resolutions against it at the Braintree town meeting. These resolutions, without the change of a word, were later adopted by more than forty Massachusetts towns; moreover, a little later they led to his selection as one of the lawyers to present a memorial against the act to Governor Bernard. Adams made the bold argument that the Stamp Act was necessarily null and void, because the colonists had taken no part in passing it. The repeal of the act ended Adams' public activity for a brief time, but his reputation was established. He was soon offered the position of advocate-general in the Massachusetts admiralty court, but he interpreted the offer as an attempt to put him in such a position that he could not freely oppose the policy of the British government, and he refused the position.

In spite of his defense of the British soldiers who took part in the Boston Massacre he was trusted by the patriot leaders and on all legal matters he was constantly consulted by John Hancock, Joseph Warren and Samuel Adams. For a year or two there was quiet in Boston and the vicinity, but in 1774 the passage of the five Intolerable Acts (which see) rekindled the flames of opposition to Britain. John Adams, with four others from Massachusetts, was chosen as a delegate to the First Continental Congress. Here his influence was great, and its resolutions concerning the rights of the colonies were the work of his pen. In the Second Congress he was one of the most

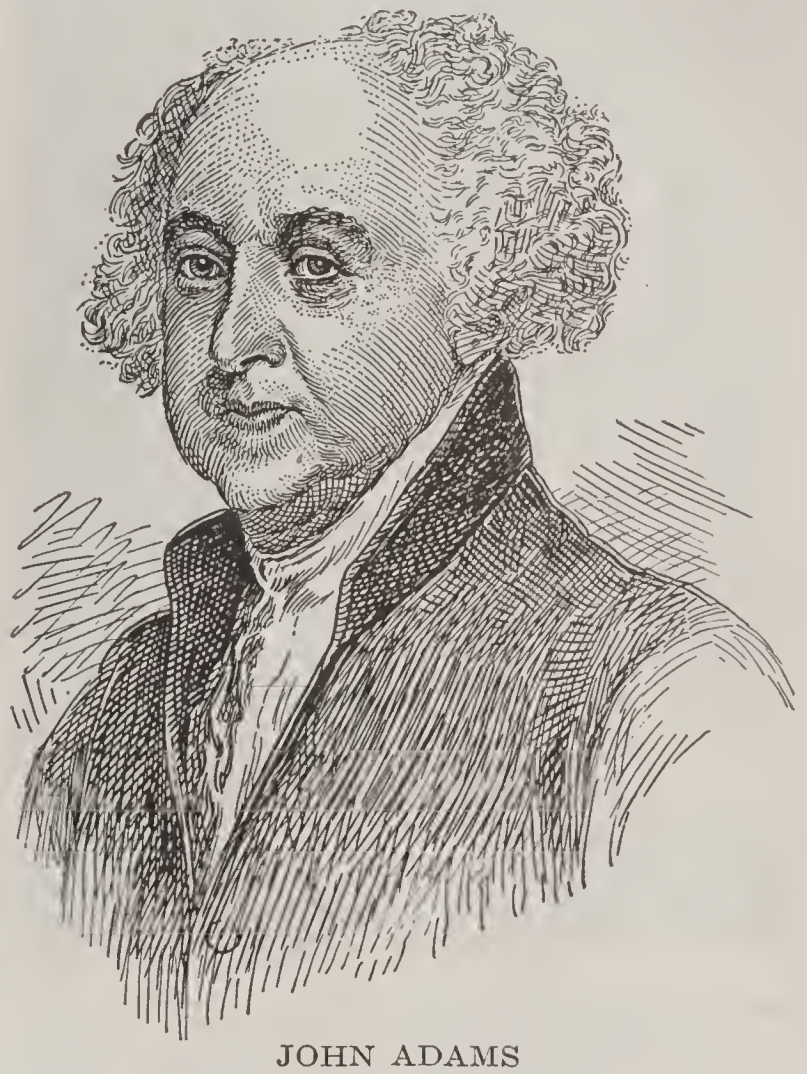
ardent advocates of independence. John Fiske, one of the great authorities on this period, said that of all the delegates, John Adams, with the exception of his cousin Samuel, was "probably the only one who was convinced that matters had gone too far for any reconciliation with the mother country." Almost entirely through his efforts, Congress adopted the 16,000 minutemen of New England as the "continental army," and chose George Washington of Virginia as commander-in-chief. Congress and Virginia were thus committed to a plan which must end in independence or in tremendous disaster.

On June 7, 1776, Richard Henry Lee presented to Congress the resolution that "these colonies are, and of a right ought to be, free and independent states." Adams seconded the motion, and on July 1, when it was discussed by Congress, defended it in what was probably the greatest speech of his life. Jefferson called him "the colossus of that debate." Adams was one of the committee appointed to draft a declaration of independence; the document was written by Jefferson, but no man did more to secure its adoption than Adams. For two years more Adams sat in Congress. He was a member of several important committees, and until after the surrender of Burgoyne in 1777 he was chairman of the Board of War and Ordnance, a position corresponding to that of the present Secretary of War.

Adams as Diplomat. Previously Adams had served his country at home, but for the ten years after 1778 his work was in Europe. He was sent to France early in that year to take the place of one of the three commissioners who were negotiating for an alliance, but the treaty was already signed before he arrived in Paris. On arriving there he found endless confusion in the commission's affairs which shocked his methodical soul. As the result of his recommendations to Congress the commission was abolished. Franklin, however, was left in Paris as minister, and Arthur Lee, the third commissioner, was ordered to Madrid.

Adams, left without instructions, sailed for home, where he was immediately elected to the convention which framed the Massachusetts constitution of 1780. This constitution, which is still the fundamental law of that state, was almost wholly the work of James Bowdoin and Samuel and John Adams. Before the constitution was adopted Adams was ordered back to France to treat for peace, but Great Britain was as yet unwilling to end the struggle. Adams was then asked by Congress to secure a loan from Holland. He was successful not merely in this respect, but also in obtaining from the Dutch government recognition of American independence and a "treaty of amity and commerce."

Adams' presence was next demanded in Paris, where negotiations for peace were under way. Adams and Jay, two of the commissioners, believed that the French government was prepared to sacrifice the United States to Spain's interests in the Mississippi Valley, and



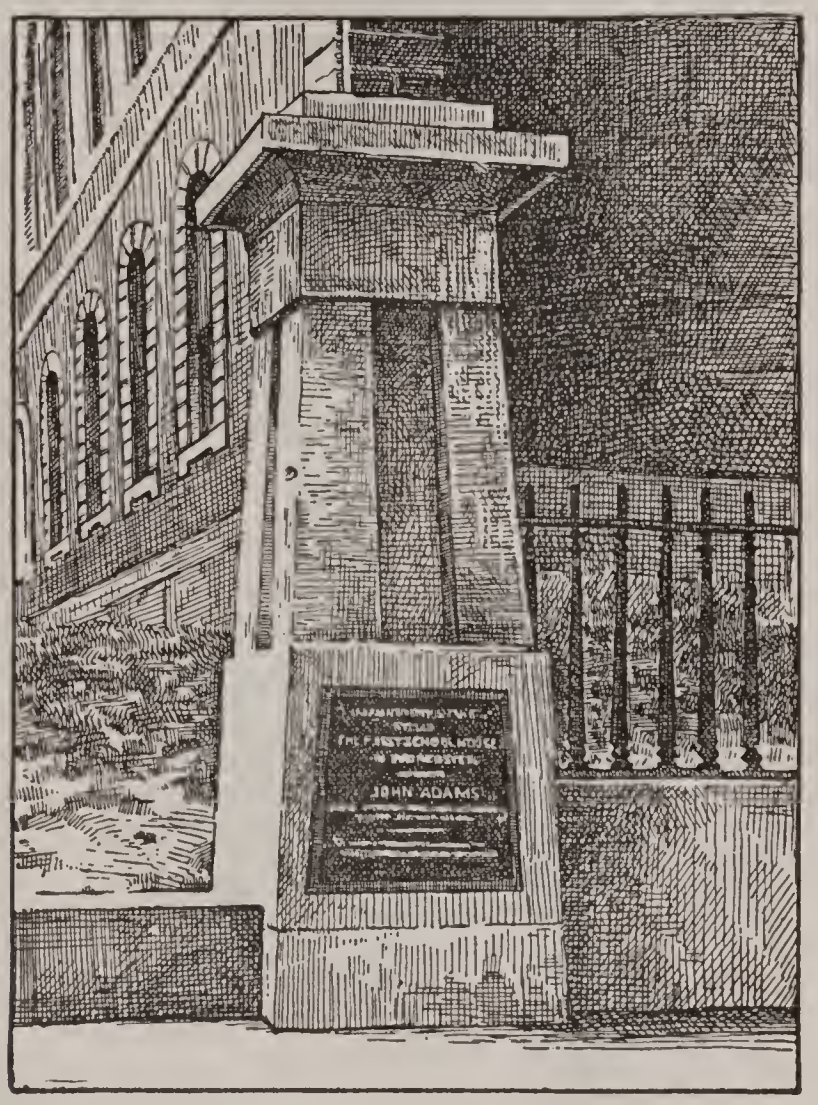
JOHN ADAMS

Diplomat, first Vice-President and second President of the United States; father of the sixth President.

they secretly carried on private negotiations with Great Britain, although they hereby violated their instructions. Thanks to their efforts, the treaty as finally signed was particularly favorable to the new nation. Adams was next appointed one of the commissioners for the purpose of negotiating commercial treaties with foreign powers, and in 1785 became the first United States minister to Great Britain. Here his independent manner, added to the fact that relations between the former colonies and the mother country were none too cordial, made his position burdensome, and finally, in 1788, he asked to be recalled.

As Vice-President. Adams had been at home only a few months when he was elected the first Vice-President of the United States.

Washington received sixty-nine electoral votes and Adams thirty-four. The latter was noticeably chagrined at the decided preference shown for Washington, and to the end of his days he could never understand why Washington's services to his country were counted greater than his own. Throughout the eight years of his Vice-Presidency, however, he put aside personal jealousies whenever questions of principle arose, and on more than one occasion



BRONZE TABLET IN WORCESTER, MASS.

The inscription bears these words: "In front of this tablet stood the first schoolhouse in Worcester, where John Adams, second President of the United States, taught 1755-1758."

his casting vote in the Senate saved the plans of Washington and his Cabinet from defeat. When Washington refused to serve a third term, Adams was his logical successor and was elected. Jefferson, his political opponent, received sixty-eight votes, only three fewer than Adams, and, under the Constitution as it then existed, became Vice-President.

The Administration of John Adams (1797-1801). The four years during which Adams was President were among the stormiest in the history of the United States. During the entire period the Federalist party was split into two sections, one owing allegiance to Adams, one to Alexander Hamilton. Hamilton, though probably the ablest member of the party, was not so generally and favorably known as Adams. The latter therefore was given the Presidency, but Hamilton tried by various schemes to prevent his election and reëlection. The feud between the two men became increasingly bitter as time went on. The members of Adams' Cabinet, it is said, even made reports to Hamilton and took orders from him rather than from Adams.

Besides the quarrels in his own party, Adams faced the violent opposition of Jefferson and the Republicans, who were French sympathizers. Adams saw no good in the French Revolution; his aristocratic temperament placed no trust in the mass of the people, and he saw only anarchy in the thrilling events in France. The Jeffersonians not only sympathized with the Revolutionary movement, but they were willing to fight for France against England. The Federalists, on the other hand, regarded every insult from France as a just reason for helping England.

Adams determined to keep the United States strictly neutral, and one of his first acts was to call Congress in special session to consider means of keeping peace. Congress sent three commissioners, C. C. Pinckney, John Marshall and Elbridge Gerry, to Paris to negotiate with the Directory, which was then the government of France. Talleyrand refused to receive them openly, but secretly sent three envoys, called in the despatches X. Y. and Z., to treat with them. The envoys proposed that the United States should pay Talleyrand and two or three others large sums for the privilege of revising the treaties with France. The commissioners, in utter disgust, broke off the negotiations. When the reasons for their failure became known, the United States was ablaze with wrath, and the cry, "Millions for defense, but not one cent for tribute," rang through the land (see X Y Z CORRESPONDENCE). Preparations for war were made, an army was quickly raised, Washington was recalled from Mount Vernon to take command, and a few naval battles were actually fought, the most notable being the sinking of the French frigate *La Vengeance* by the *Constellation*. See TALLEYRAND-PERIGORD, CHARLES MAURICE.

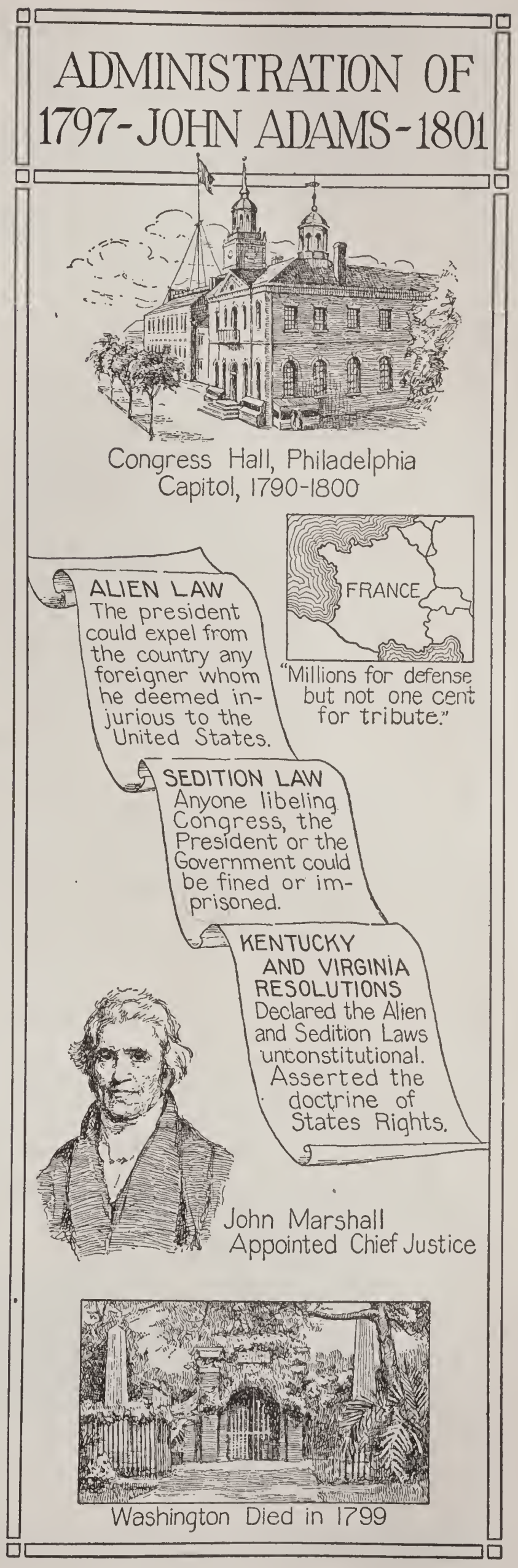
Though Adams hated the French Revolution and all its works, he was equally opposed to war with France. The popular clamor only strengthened his resolve to keep peace and to meet France at least half-way. When Talleyrand found that his policy was threatening to drive the United States into alliance with Great Britain, he intimated his willingness to

come to terms and to deal with three new commissioners appointed by Adams. Before these three reached Paris the Directory had been overthrown, but they adjusted all difficulties with Napoleon, who had become First Consul. The appointment of this commission, which Adams had chosen without informing his Cabinet, completed the breach in the Federalist party and endangered the reëlection of Adams.

Now that war had been averted, another affair contributed to the end of the Federalist party. In 1798, while the war excitement was at its height, Congress had passed the Alien and Sedition Laws (which see). These acts, promoted by the Federalists, were really in violation of the constitutional rights of freedom of speech and freedom of the press. They called forth the famous Kentucky and Virginia Resolutions (which see), in which the doctrine of nullification was first stated. Here was the first sign of the struggle over states' rights which later nearly split the Union into two sections.

In the election of 1800 the Federalists voted for Adams and C. C. Pinckney; the former received sixty-five votes, the latter sixty-four. Burr and Jefferson, the Republican candidates, each received seventy-three votes. Since there was a tie between these two in accordance with the Constitution the election fell into the House of Representatives, which chose Jefferson as President and Burr as Vice-President. Adams refrained from any participation in the bargaining which led to this result. One of his last official acts as President was the appointment of John Marshall as Chief Justice of the Supreme Court.

Old Age. Adams was nearly sixty-six at the end of his term. He retired to private life feeling that his failure to secure reëlection was a disgrace. He was so bitter and enraged that he refused to remain in Washington for the inauguration of his successor, but hurried off in his coach on the morning of March 4, 1801. For twenty-five years he lived quietly at his old home in Quincy, emerging from his retirement in 1820, when he was chosen a delegate to the convention for revising the Massachusetts constitution. For many years the bitterness of his defeat in 1800 remained, but its sting was partly removed when he saw his son John Quincy Adams elected as the sixth President. John Adams died on July 4, 1826, the fiftieth anniversary of the signing of the Declaration of Independence. On the same day, and only a few hours earlier, Thomas Jefferson



OUTLINE ON LIFE OF JOHN ADAMS

Outline

I. Preparatory Years

(1) Birth and family
(2) Education
(3) Marriage

II. Early Public Life

(1) In fight against Stamp Act
(2) Defends British soldiers
(3) Delegate to First Continental Congress.
  (a) Suggests choice of Washington as commander-in-chief
  (b) Seconds resolutions declaring colonies free and independent
(4) As diplomat
  (a) In France
  (b) In Holland
  (c) In Great Britain
(5) As Vice-President
  (a) Frequently saved Washington's plans by casting vote

III. His Administration

(1) Troubled conditions
  (a) Split in Federalist party
  (b) Opposition of Republicans
(2) Difficulties with France
  (a) X. Y. Z. Correspondence
  (b) State of war
  (c) Second mission
  (d) Peace
(3) Alien and Sedition Laws
  (a) Naturalization
  (b) Alien acts
  (c) Sedition act
(4) Kentucky and Virginia Resolutions
  (a) Alien and Sedition acts violate Constitution
  (b) Constitution merely an agreement between states as partners
  (c) Decision as to whether a law is in accord with Constitution rests with each state
(5) Midnight Judiciary
(6) Election of 1800
  (a) Formation of parties
  (b) Candidates
  (c) Election by House of Representatives
  (d) Downfall of Federalists
(7) Other events
  (a) Eleventh amendment to the Constitution
  (b) Death of Washington
  (c) John Marshall appointed Chief Justice
  (d) Capital removed to Washington
  (e) Department of the Navy created
  (f) *Hail Columbia* written

IV. Character

(1) As a man
(2) As political leader

Questions

What epitaph did Adams say would please him?
What was the X. Y. Z. Correspondence?
What was the cause of the "Quasi-War" with France?
Did any actual hostilities occur as a result of this tension?
Why were the Alien and Sedition Laws passed?
What was their most conspicuous effect?
What great jurist was appointed to the Supreme Court by Adams?
Why did Adams fail of reëlection?
How did he show his sense of shame at this failure?
What patriotic song was published in the time of the difficulties with France?
What was Adams' opinion of his own services to the country as compared with those of Washington?
How do critics regard the work which Adams did in securing the treaty with England in 1783?
How did Adams prove during his term as Vice-President that he was superior to petty jealousies?

breathed his last. Once bitter enemies, in old age the two men had become good friends, and Adams' last words were, "Thomas Jefferson still survives." Adams died in his ninety-first year, the highest age attained by any President.

Abigail Smith Adams (1744-1818), was the wife of John Adams and one of the most famous women of Revolutionary times and the early days of the American republic. During her childhood she was always delicate, and her education, so far as book-learning went, was slight. But she read extensively and in later life was known for her knowledge of the best in literature. From childhood she always associated with people of learning and intelligence. She was keen, sunny and witty, and during many trying years she was a comfort and support to her husband. She was no less zealous than he in trying to secure American independence. During the war she was frequently separated from him, even for several years at a time, while he was first in Congress and later in Europe. She joined him in Paris in 1784 and was also with him in England, where she seems to have been rudely treated. Mrs. Adams was the first mistress of the White House, into which the Adams family moved in 1800. Her description of the barn-like structure, as it seemed to her, with its great East Room, in which she used to hang the family wash to dry, is one of the gems from her pen. Her letters are extremely valuable for their vivid pictures of social life and for their clever comments on public men of that day. A.B.H.

Other Items of Interest. Adams was the only President whose son attained the same high honor.

The popular nickname of Adams is "The Firm Federalist."

The treaty of 1783, with the negotiation of which Adams had much to do, is called by a competent authority "one of the most brilliant triumphs of modern diplomacy."

During his term as President, his portrait was painted by the famous Gilbert Stuart, who painted so many of the great men of the Revolutionary period.

It was during his administration that the seat of government was moved from New York to Washington.

The death of Washington occurred while Adams was in the Presidential chair.

The Department of the Navy was created during his term of office.

The French called him the "Washington of negotiations."

Adams continued his judiciary appointments up to midnight of the last day of his term of office and even left some commissions undelivered on the executive table. These Jefferson, his successor, set aside.

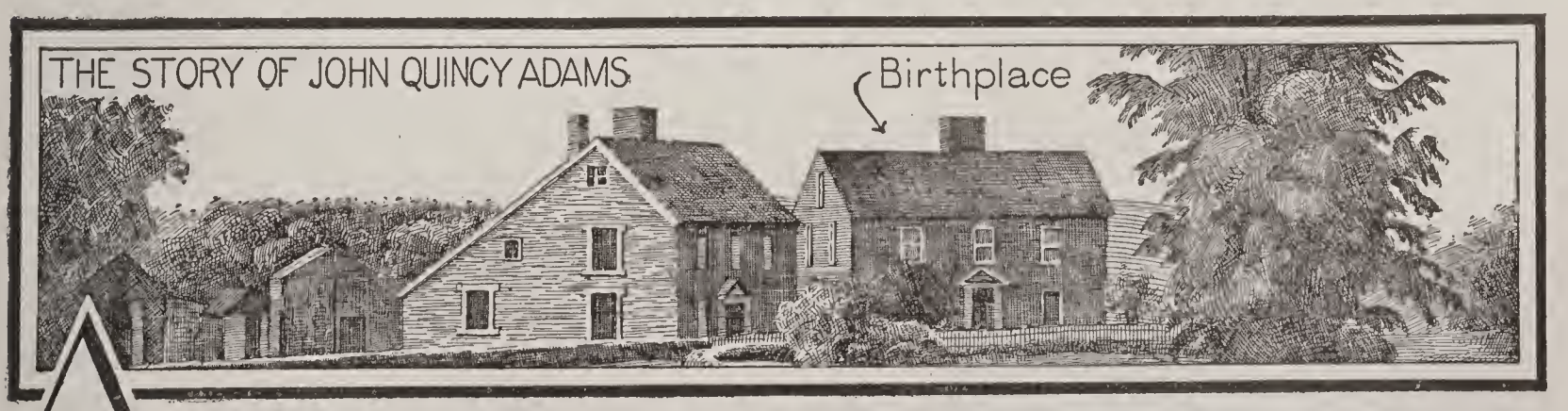
It was during the period of tension with France—the "Quasi-War" as it was called—that *Hail Columbia* was written.

Hearing the bells and cannon on the day of his death, Adams asked the cause of the celebration, and when told that it was Independence Day he exclaimed, "Independence forever!"

The famous words "Sink or swim, live or die, survive or perish, I give my hand and my heart to this vote" are usually quoted as a part of a speech of Adams. In reality they represent merely what Adams *might* have said in the Declaration of Independence debate, and are taken from Webster's eulogy on Adams and Jefferson.

In appearance he was much like the pictures of "John Bull"—short, stout, florid and dogmatic.

Consult Chamberlin's *John Adams;* Morse's *Letters of Abigail and John Adams;* Parker's *Historic Americans,* also the article *United States,* subtitle *History,* in these volumes.



ADAMS, JOHN QUINCY (1767-1848), sixth President of the United States and eldest son of John Adams, the second President. Both father and son were distinguished diplomats, and both represented their country in Holland, in Russia and in Great Britain. John Adams was minister to Great Britain in the trying days at the close of the Revolutionary

War; John Quincy Adams had the same position after the War of 1812. It is remarkable that Charles Francis Adams, the latter's son, served his country in London during and after the War of Secession. Both John Adams and his son returned from years of diplomacy to high positions at home, the one to become Vice-President, the other to become Secretary of State. Both then served a single term as President; but here the parallel ends, for the father retired to private life, whereas the son entered a new field of political activity.

Nothing in his life is more characteristic of John Quincy Adams than his services for the last seventeen years of his life in the House of Representatives. He had held the Presidency, the highest office in the gift of the people, but instead of retiring to a premature old age—he was only fifty-two at the end of his term—he sought election to Congress. In the House of Representatives he never allowed any consideration of personal or party welfare to swerve him from the course he thought right. He opposed Jackson's high-handed policy toward the Bank of the United States, but supported his stand against nullification (which see). For several years his chief work was the presentation to Congress of petitions for the abolition of slavery, and after the House adopted the "Gag Rules" in 1836 to keep such petitions out, he fought for ten years until the restricting measures were repealed.

These years from 1836 to his death were perhaps the most interesting period of his life. As a parliamentarian and as a debater he was more than a match for any member of the House, and he earned the title of "Old Man Eloquent." Nothing pleased him more than a word-fight with every slaveholder in the House. On the other hand, the English language seemed powerless to express the hatred of his opponents for him. He was even threatened with assassination, yet his ability and his courage won the respect of his enemies.

His Youth. John Quincy Adams was born on July 11, 1767, in Quincy, Mass. Until his eleventh year he lived here, but in 1778 accompanied his father to France. He attended school in Paris, Amsterdam and Leyden, and at the age of sixteen went to Petrograd as secretary of the American legation. After a year in Russia, where the American representatives tried in vain to secure official recognition, young Adams traveled alone for several months through Sweden, Denmark and Northern Germany before rejoining his father in Paris. There he was at once set to work as secretary, and helped to draft the treaty of peace between the United States and Great Britain.

In 1785, when John Adams was appointed minister to Great Britain, his son returned to the United States, because he felt that an American education was the best equipment for an American career. He entered Harvard College, was graduated in 1788, then studied law, and in 1791 was admitted to the bar. The law, however, bored him so that he took his relaxation in writing a series of articles on questions of the day. He criticized some of the doctrines of Thomas Paine, defended Washington's policy of neutrality, and discussed the Citizen Genet incident (see GENET, EDMON). So able were these papers that they were at first attributed to his father.

Diplomat and Legislator. Though the young man was only twenty-seven years old, President Washington, in 1794, sent him to Holland as United States minister, and two years later transferred him to Portugal. He was about to start for Lisbon when he received word that his father, who had meanwhile become President, had promoted him to be United States minister at Berlin. George Washington advised the appointment in the strongest terms, and predicted that "the young man would prove to be the ablest diplomat in the American service." He took up his new duties in the autumn of 1797, and remained in Berlin until 1801, when his father recalled him. Soon after his return he was elected to the Massachusetts Senate, but in 1803 he exchanged this place for a seat in the United States Senate.

In the Senate he was a free lance. He was nominally a Federalist, but he frequently voted with the Republicans. The Hamiltonian Federalists, who were strong in the Senate, first hated him because he was the son of his father, and later they insulted him on his own account. Threats and insults were never of much avail against Adams; he went his own way. He defended the Louisiana Purchase, and was an ardent supporter of the Embargo and Non-Importation Acts of 1807, although New England stood strongly against them. The abuse heaped on him by his own constituents has scarcely been equalled in the history of the United States. To add insult to injury, the legislature elected his successor several months before the usual time. Adams accepted the insult as it was intended, and immediately resigned. From 1806 to 1809 he was a professor of rhetoric at Harvard College, and in the

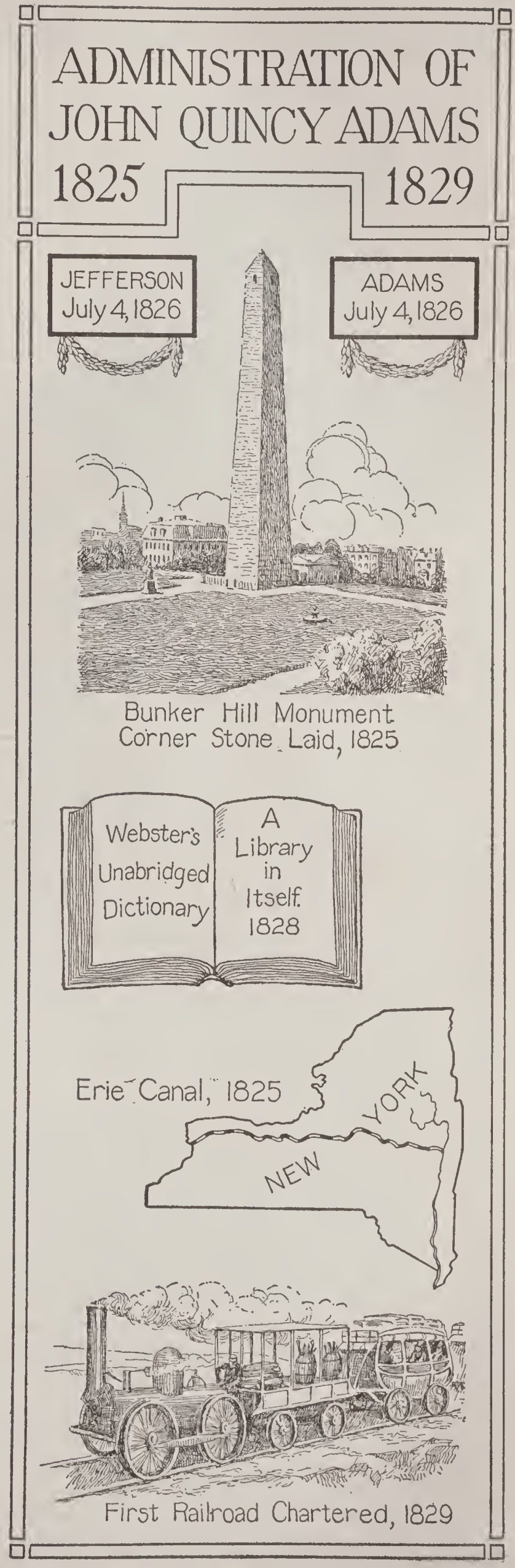
intervals of his public duties found time to deliver lectures.

For the moment Adams was in private life, but he was too great a figure to be brushed aside by petty politics. One of Madison's first acts as President was to nominate him minister to Russia, where he remained until 1814. Adams next acted as one of the commissioners to make peace between Great Britain and the United States, at the close of the war of 1812. After the Treaty of Ghent was signed, Adams, with Henry Clay and Albert Gallatin, went to London to negotiate a new commercial treaty, but before the treaty was prepared he received the news of his appointment as minister to Great Britain. After two years, 1815-1817, in London, he was recalled by President Monroe to become Secretary of State.

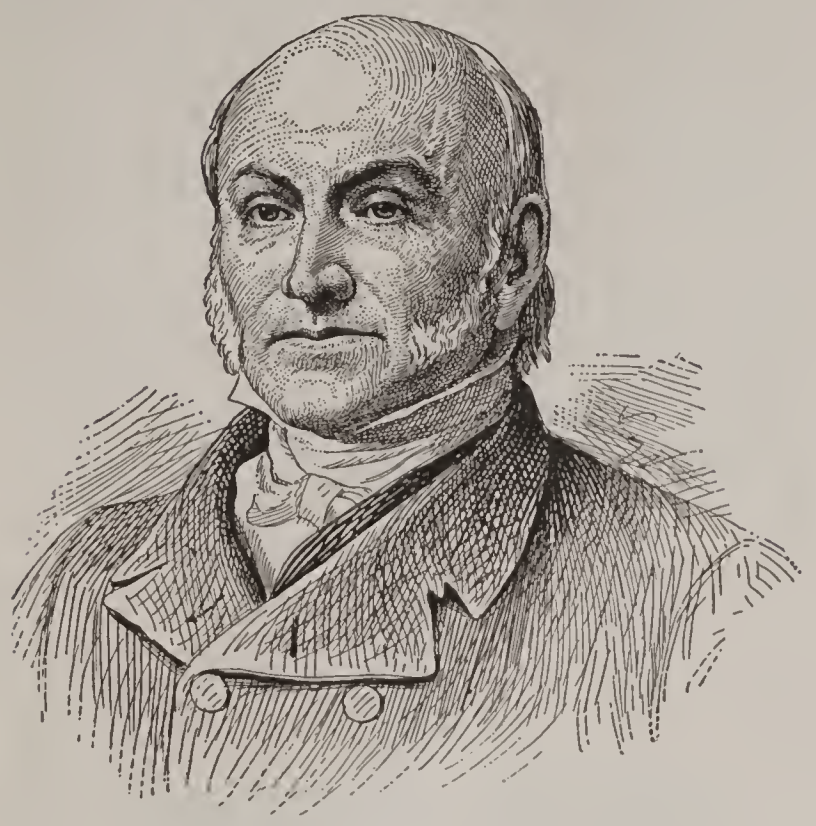
Secretary of State. In his new post Adams conducted the negotiations which resulted in the fisheries' convention of 1818 with Great Britain. By this convention the United States renounced the right to fish in British waters in North America, a right established by John Adams in 1783. Adams earnestly supported Jackson in his vigorous methods in Florida, and also conducted the negotiations which led to the cession of Florida to the United States in 1819. By far his most important work, however, was in opposing the plans of the Holy Alliance (which see), and most of the credit for formulating and announcing the Monroe Doctrine belongs to him.

As Secretary of State, Adams was regarded by many as Monroe's logical successor to the Presidency. Adams, however, made no efforts to secure his own election. He was not indifferent to the honor, but it was not in his nature to make any attempts to secure it. The other candidates for the Presidency were Andrew Jackson, Henry Clay, William H. Crawford and John C. Calhoun. Calhoun withdrew before the election, and with almost no opposition was elected Vice-President. The electoral vote for President stood 99 for Jackson, 84 for Adams, 41 for Crawford and 37 for Clay. As no candidate had a majority, the House of Representatives, under the Constitution, was required to choose between the three who had received the highest number. This left out Clay, whose great influence in the House was thrown to Adams. Adams was elected.

The Administration of John Quincy Adams, (1825-1829). Adams chose Clay as his Secretary of State. This action was not unnatural, for



Clay had always taken an active part in every discussion of foreign affairs. Clay and Jackson, however, were not on good terms, and the friends of Jackson preferred to see a corrupt bargain, by which Adams gave Clay this office in return for his influence in the election. Though this charge has long since been disproved, it pursued Clay to the end of his days. The resulting quarrel between Adams and Jackson had far-reaching results. At first the followers of the two rivals called themselves "Adams men" or "Jackson men," but as time went on, the division into new political parties became clear. The Jackson men became Democrats, the Adams men were first National Republicans, then Whigs (see DEMOCRATIC PARTY; WHIG; POLITICAL PARTIES IN THE UNITED STATES).



JOHN QUINCY ADAMS

Sixth President of the United States and son of the second President.

In many respects the four years during which Adams was President are the least interesting of his life. Practically the entire term was taken up with partisan quarrels, and the plans of the administration were always bitterly opposed, regardless of their merit. The Jackson men were strong enough to kill most of the important legislation proposed. One law, however, must be noticed, the Tariff of Abominations (see TARIFF). This was passed in response to the demand from the North, especially New England, for protection for the manufacturing industries which had arisen during the War of 1812. The South, predominatingly an agricultural region, wanted free trade, and attacked the law as intended to benefit New England and the Middle States at the expense of the South. The doctrine of nullification, as stated in the Kentucky and Virginia Resolutions of 1798, was again asserted, and a few years later nearly caused bloodshed.

During the administration of Adams the United States was involved in negotiations with Mexico and Great Britain over boundaries. Neither of these questions was definitely settled, but the Oregon dispute was temporarily laid aside by "joint occupation" (see OREGON). The United States also had a dispute in 1826 with the state of Georgia, which successfully defied the national authority (see GEORGIA, subhead *History*).

Panama Congress. An important international conference was the Panama Congress, held at Panama in 1826 for the purpose of discussing the slave trade and other questions of interest to the countries of North and South America. Adams, probably prompted by Clay, accepted an invitation to send delegates, but his announcement that "ministers will be commissioned to attend" caused one of the most violent debates ever held in Congress. The opposition was specially aroused by fear of entangling alliances, and by the proposals to end the slave trade and to recognize Haiti, a negro republic. Congress finally agreed to send two ministers, but one died on the way and the other reached Panama too late.

Other Events. In his inaugural address and his first message to Congress, Adams recommended many "internal improvements," including public roads and canals, a national university and national observatories. Congress did appropriate about $14,000,000 for such work, but this was much less than Adams wanted. One of the most notable improvements built by state aid was the Erie Canal, completed in 1825. The first railway in the United States was opened in 1826, to haul stone from Quincy, Mass., Adams' old home, to Charlestown, for the construction of the Bunker Hill Monument. The corner stone of the monument was laid on June 17, 1825, exactly fifty years after the battle. Another striking coincidence occurring on July 4, 1826, exactly fifty years after the signing of the Declaration of Independence, was the death of John Adams, his father, and Thomas Jefferson. The two men died within a few hours of each other.

Election of 1828. Adams had never been popular with the people at large, and he had, moreover, made no attempt to build up a political machine. There was also a feeling that

OUTLINE ON LIFE OF JOHN QUINCY ADAMS

Outline

I. Early Years

(1) Ancestry and birth
(2) Travels
(3) Education

II. Early Political Career

(1) As diplomat
  (a) In Holland
  (b) In Portugal
  (c) In Berlin
  (d) In Russia
(2) In the Senate
(3) As Secretary of State under Monroe
  (a) Fisheries' convention
  (b) Florida purchase
  (c) Monroe Doctrine
  (d) Elected to Presidency by House of Representatives

III. His Administration

(1) Governmental affairs
  (a) Clay and the "corrupt bargain"
  (b) Tariff of Abominations
  (c) Oregon dispute
  (d) Defiance of national authority by Georgia
  (e) Panama Congress
(2) Internal improvements
  (a) Erie Canal
  (b) First railroad
(3) Other events
  (a) Death of John Adams and Jefferson
  (b) Webster's Dictionary published
  (c) Bunker Hill Monument erected
(4) Election of 1828
  (a) Issues and parties
  (b) Candidates
  (c) What the result meant

IV. Later Life

(1) In the House of Representatives
  (a) "Old Man Eloquent"
  (b) Fight against extension of slavery

V. Character

(1) As a man
  (a) Reasons for unpopularity
(2) As political leader

Questions

1. How was John Quincy Adams elected? Why was this necessary?
2. What two famous men died during Adams' administration?
3. Who laid the corner stone of Bunker Hill Monument? Who delivered the speech of dedication?
4. What was Adams' first public service?
5. How did Adams prove his sincere desire to serve his country and not merely to attain political ambitions?
6. Why was Adams not popular in his own day?
7. In how many countries did Adams serve his government as diplomat?
8. How was Adams' appointment of Clay as Secretary of State misconstrued?
9. What lasting result did the quarrel between Adams and Jackson have?
10. Sum up your impressions of the character of Adams.
11. Name one very important internal improvement that was made during this administration.
12. What new method of transportation was introduced?
13. What was meant by the "joint occupation" of Oregon?
14. Why was not Adams reëlected?
15. What two popular nicknames did Adams win in the latter part of his life?
16. What speech of Adams showed that he understood clearly just how the slave question would finally become a matter to be dealt with by Federal authority?

Jackson should have been chosen in 1824, and he was still the popular hero. Opposition in the South and in New England to the plans for internal improvements, disapproval of the high tariff of 1828, and the demand of the West for a hearing all combined to make Adams' reëlection impossible. Jackson was the people's choice (see JACKSON, ANDREW).

The "Old Man Eloquent." At the close of his term, Adams returned to his home in Quincy, Mass. Two years later he entered the House of Representatives, with the aid of the votes cast by the Anti-Masons (which see), and for seventeen years he served without a break. He was once asked if he did not think that membership in the House was degrading to a man who had once been President, but he proudly replied that no person could be degraded by serving the people as a Representative in Congress, or even, he added, as a selectman of his town. For these seventeen years he was the leader in Congress in the fight against the extension of slavery, although he was not himself an abolitionist. It is noteworthy that he seems to have been the first to proclaim the doctrine on which Lincoln based the emancipation of negro slaves, for in as early as 1836 he said in a speech in Congress: "From the instant that your slaveholding states become the theater of war—civil, servile, or foreign—from that instant the war powers of the Constitution extend to the institution of slavery in every way in which it can be interfered with." After 1845, when he secured the repeal of the "Gag Rules" which prevented the presentation of petitions about slavery, Adams spoke less often. Late in 1846 he had a stroke of paralysis, which confined him to his home for several months. On February 21, 1848, when at his desk on the floor of the House, he suffered a second stroke. He was carried to the Speaker's room, and he died two days later. A.B.H.

Additional Points of Interest. A favorite name for Adams in his own days was "The Walking Vocabulary."

The deaths of John Adams and of Jefferson occurred during his administration.

When the Erie Canal was opened the news was "telegraphed" to New York by cannon fire. The cannons were placed at intervals of thirteen miles between Buffalo and New York.

As the last cannon was fired, a keg of water from Lake Erie was poured into the Atlantic to symbolize the union of the ocean and the Great Lakes.

John Q. Adams left what has been called by far the most valuable diary in existence. It is in twelve large volumes, and contains his comments on events from 1795 to 1848. It gives of himself "a portrait more full, correct, vivid and picturesque than has ever been bequeathed to posterity by any other personage of the past ages."

The first edition of Webster's Dictionary appeared during Adams' administration.

Months before the Monroe Doctrine was ever announced or even formulated Adams told the Russian minister "that the American Continents are no longer subjects for any new European colonial establishments." This is the first hint of the famous doctrine.

Affectionate with his family, Adams had toward most people a cold, repellant manner, and it is not strange that "no man of pure life and just purposes ever had fewer friends or more enemies."

Short, stout and bald, with a high shrill voice, liable at any time to break, Adams owed none of his power as an orator to personal attractiveness.

Adams' last words were, "This is the last of earth! I am content."

For further study consult *Memoirs*, written by himself and edited by Charles Francis Adams; Morse's *John Quincy Adams*.

ADAMS, MAUD KISKADDEN (1872-), an American actress, very popular because of her presentation of such rôles as Babbie in *The Little Minister* and Peter Pan in the play of the same name. She was born in Salt Lake City, Utah, appeared on the stage while a child, and at sixteen years of age joined E. H. Sothern's company. As a member of Frohman's stock company her reputation grew steadily and she gained great popularity as Juliet, and as the Duc de Reichstadt in *L'Aiglon*. Later she appeared in the title rôle of Rostand's *Chantecler*, and in Barrie's *Legend of Leonora*.

ADAMS, SAMUEL (1722-1803), an American statesman of the famous Adams family, second cousin of John Adams, and one of the signers of the Declaration of Independence. He early devoted himself to politics, and in the dispute between America and the mother country he showed himself one of the most efficient and unselfish laborers for American freedom and independence. Several influential political papers for the cause of independence were written by him. Adams sat in Congress eight years, but during that period showed a lack

of depth of view and legislative wisdom. From 1789 to 1794 he was lieutenant-governor of Massachusetts, from 1794 to 1797 was governor, and then retired from public life.

ADAMS, Mass., an industrial city, in the extreme northwestern part of the state, in Berkshire County, about five miles south of North Adams and fifteen miles north of Pittsfield. The town is beautifully situated on both banks of the Hoosac River, in the midst of the famous Berkshire Hills; Greylock Mountain, the loftiest peak in the state, is within the town's limits. Railway accommodations are afforded by a branch of the Boston and Albany Railroad. Its population comprises a large number of Poles, and decreased from 13,026 in 1910 to 12,967 in 1920.

Adams was founded in 1749 as East Hoosick and was renamed for Samuel Adams, the American Revolutionary leader, when it was incorporated in 1778. Its area is over eighteen square miles and includes the villages of Renfrew, Maple Grove and Zylonite. The most important industries are the Berkshire Cotton Manufacturing Company, the Renfrew Manufacturing Company and the L. L. Brown Paper Company. The town excels in the grade of its cotton manufacture, has many churches and schools, a public library and four banks. In the vicinity is a natural bridge of local note, across Hudson's Brook. A fine statue of Former President McKinley is a conspicuous ornament of the city. E.K.MC P.

ADAM'S APPLE, the projecting cartilage of the larynx, noticeable under the skin on the throat of all people, in some appearing very prominently. It received its name from the belief of the ancients that a piece of the apple given to Adam by Eve (*Gen.* III, 6) stuck in his throat. See Larynx; Cartilage.

ADDAMS, Jane (1860-), an American social settlement worker, esteemed for years as "the first woman of Illinois," and famous the world over for her work at Hull House. Born at Cedarville, Ill., she studied at Rockford Seminary, in Europe, and at the Women's Medical College in Philadelphia; then, convinced by her study of social conditions that she should devote her life to work among the poor, she went to Chicago and there founded Hull House (which see), a social settlement in the city's slums. In all her early work she had the assistance of Ellen Gates Starr.

Energetic and capable, sympathetic but not sentimental, and gifted with the ability to grasp at once the problems of the poor, Miss Addams soon won a place for herself and her institution in the life of the neighborhood, and it was not long before Hull House was recognized as the leading social settlement of the United States. Miss Addams, too, came to be looked upon as an authority on many social questions. On such questions as the evils and the possibilities of tenements, the problem of child labor and the like, she thought deeply and wrote and spoke well. Nor did she confine herself to her work at Hull House. For three years she did most efficient service as an inspector of streets and alleys, and in 1909 she acted as president of the National Conference of Charities and Correction. She became active in the movement for woman's suffrage, and took a prominent part in the formation of the Progressive party in 1912.

JANE ADDAMS
Of world-wide fame as an authority on social problems.

In April, 1915, when there was convened at The Hague an International Women's Peace Congress, with delegates from fourteen countries, she was made its chairman, and was further intrusted with the duty of visiting the warring nations and presenting to their governments the women's peace petition. On that errand she was received by the leading statesmen of the Continent and by the Pope. It was expected that she would be an influential member of the Ford peace party, but a serious illness compelled her to remain at home (see Ford, Henry). She was unable because of a long-continued illness to join the party later in Europe.

The most popular and widely-read of Miss Addams' books is *Twenty Years at Hull House,* a fascinating account of her great work; but no less authoritative in their way are her other publications, *The Spirit of Youth and the City Streets, Democracy and Social Ethics* and *A New Conscience and an Ancient Evil.* A.MC C.

ADDAX, *ad' ax,* or **ADDAS,** a species of antelope of Northeastern Africa, about three feet in height at the shoulders, and reddish white in color. It has large, rounded hoofs, which enable it to run with great speed across the desert

sands. The horns are about four feet long, beautifully twisted into wide sweeping spirals with the points directed outward. It has tufts of hair on the forehead and throat, and a white

ADDAX

blaze or stripe on the nose. It is hunted by Arabs with greyhounds, both for its flesh, which is used for food, and for its skin, which is valuable commercially.

ADDER, a name applied to several varieties of poisonous snakes, but especially to the copperhead and the water moccasin. When angry, the adder has the habit of puffing out or swelling the upper part of its neck. The *puff adder* is a South African snake whose bite is nearly always fatal. The natives, in some parts, poison their arrows with its venom. The only poisonous snake of Great Britain is the adder, belonging to the snake family of vipers. It is easily recognized by a distinct V-shaped mark on its head. See COPPERHEAD; MOCCASIN; SNAKE.

The poison of the adder is comparatively slow in action, and one bitten may linger for days before death or recovery. The use of strong doses of whisky or brandy in case of snake bite, though once believed in, is strongly condemned by medical authorities. Stimulation can be more satisfactorily produced by means of ammonia or strychnine, and without the harmful reaction caused by alcohol. A ligature must be applied above the wound, which should be bled freely by cutting with a clean knife. To suck out the poison is dangerous. The wound should be well washed with a solution of permanganate of potash. Burning with nitrate of silver is also beneficial. The most reliable treatment, however, is not always available; this consists of injections of serum from animals which have been rendered immune by inoculation of snake venom.

ADDER'S TONGUE. See DOG'S-TOOTH VIOLET.

ADDING MACHINE, a name generally but not always accurately applied to computing machines. Not only do these devices add sums of figures mechanically, but many of them can be manipulated so they will subtract, multiply and divide, the latter operations being as simple as those of addition. See CALCULATING MACHINES, for description of the various types.

ADDIS ABEBA, *ah' dis ah bay' bah,* the capital of Abyssinia, situated at an altitude of over 8,000 feet, is one of the world's strangest cities. It is 300 miles from the ocean, and as yet only a trail leads from the capital to the nearest port; a railroad, however, is projected. Its buildings are low, rude and particularly uninviting; it has no streets, for its houses are set down wherever convenience suggests. The only native school in the entire country is in this city. Addis Abeba was the scene of the signing of the treaty of peace between Italy and Abyssinia in 1896, in which Italy resigned her claim to a protectorate. Population, estimated at 50,000. See ABYSSINIA.

ADDISON, JOSEPH (1672-1719), an English poet and essayist, of whom Samuel Johnson said he who would attain the perfection of English style "must give his days and nights to the volumes of Addison." He was born at Milston, in Wiltshire, studied at Oxford, and won a name for himself by his easy, graceful Latin verse. After his graduation he was given a pension by the government, which enabled him to travel on the Continent for several years. In 1704 he wrote *The Campaign,* a poem addressed to the Duke of Marlborough, celebrating his victory at the Battle of Blenheim, and this secured him several government appointments.

JOSEPH ADDISON

He began to write for the *Tatler* in 1709, and for its successor, the *Spectator,* in 1711, and in 1713 produced the tragedy of *Cato,* which met with great success. His marriage to the dowager Countess of Warwick occurred in 1716, but he gained little happiness from the union.

Of Addison's poetry one or two sacred pieces will endure as long as the language; but it is by his essays in the *Spectator* that he is best known. For humor and poetic grace, for elegance of style and for good-humored satire, these essays remain unsurpassed. Addison had a serious purpose in writing these papers, light as many of them are; for in them he attacked certain abuses and absurdities in the manners and morals of his day, and in many instances succeeded in correcting them. The best-known of the *Spectator* papers is the delightful series on *Sir Roger de Coverley,* with its excellent character-drawing, regarded by critics as a step in the development of the novel. In his own day Addison was no more admired for his genius than beloved and respected for the kindness, gentleness and uprightness of his character. L.H.

ADDITION. Addition follows close upon counting, is related to it; indeed, it is a short method of counting. Arithmetic begins with counting and measuring. Counting in a broad sense is really measuring.

The lowest tribes perform the operation of counting, and children will be delighted with stories from naturalists tending to show that animals count (see ARITHMETIC). They will be more interested to know that observers among the tribes of South America, Australia and various islands report many tribes who have names for numbers only to two or three or five, their highest number being the word for *plenty* or *many* or *heap.* This seems to indicate that they become mentally confused when the number of objects exceeds 2 or 3 or 4. The Tasmanians count "parmery, prica, cardia," or *"1, 2, more than 2";* or *"1, 2, plenty."* The New Hollanders have no name for numbers beyond 2. The Watchandie count *"1, 2, many, very many,"* and if pressed hard will add the counts *"2+1, 2+2,"* thus reaching 4. In Queensland a traveler finds the tribes counting "ganar, burla, burla-ganar, burla-burla, korumbo," that is, *"1, 2, 2+1, 2+2, much,"* or *"great."* Another tribe improves upon this by having a 3, and so count *"1, 2, 3, 3+1, 3+2, 3+3,"* reaching 6. In this simple count is seen the beginning of addition. The child counts first after the manner of the savage. He says, *"1, 2, 3, 6"; "1, 2, 3, 4, 10";* or *"1, 2, 3, a lot,"* showing that his mind grasps the 1, 2, 3 or 1, 2, 3, 4, and then is indefinite. Later he makes the combinations, seeing 2+1, 3+2, 3+3 and so on.

When the child first counts objects he may think of "one" as the name of the first object, "two," the name of the second, and so on. Being asked for two, he gives the *one* object which he called "2" in counting. Asked to show 3, or 4, he points to the *one* object which he called "three" or "four" in counting. This state of mind in early counting is very common. It often escapes the attention of the teacher or the parent who is teaching the child; it escapes her because of the simplicity of the counting process to the adult. The error often persists through the early months of school life and confuses the child in his first steps in counting, and, indeed, in his early number thought in general. The teacher at school must meet this difficulty and overcome it, and the mother in her play-counting at home with the child can do much to clear the little one's path of such misconception.

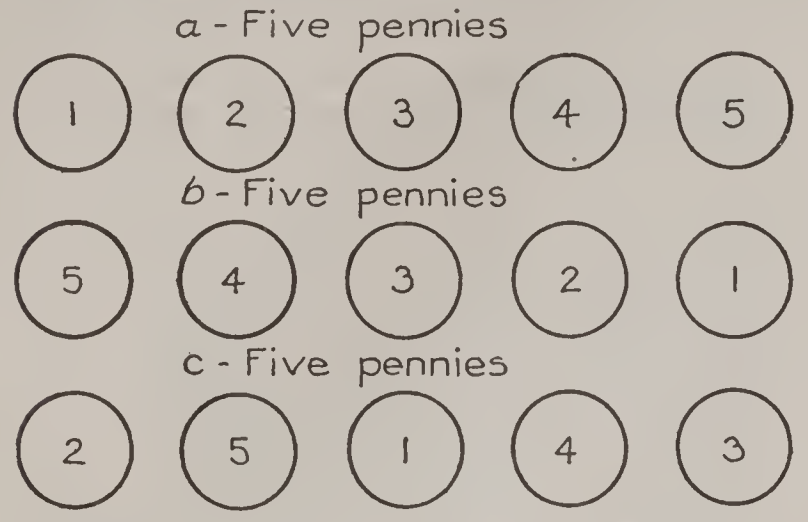
Exercises such as the following are exceedingly helpful at this stage:

COUNTING PENNIES

(1) The child is counting pennies; the teacher or mother says, "Give me one penny; give me another penny. Now I have two pennies; give me another one. Now I have two pennies and 1 penny; that is 3 pennies," and so on. The teacher and child may alternate in counting, or two children may count in this way while the teacher and other children observe.

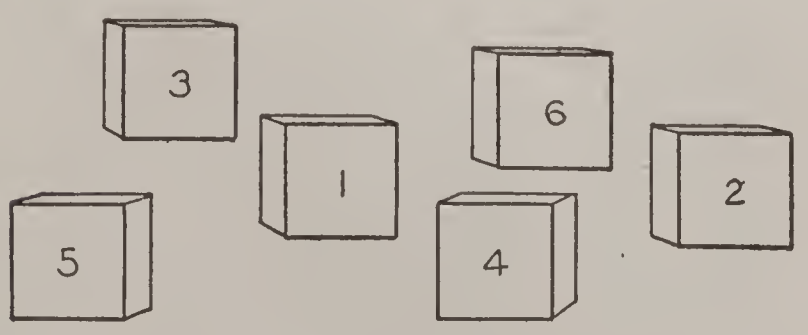
(2) Place a group of pennies on the table to

be counted; count them with the child, beginning at the left, then at the right, in the middle, and so on, so that a different penny gets a new count name each time.



VARIATIONS IN COUNTING

(3) Then count in this way: take one penny in hand on count "one"; take two pennies in hand on count "two;" three pennies in hand on count "three," and so on, exhibiting the group on each count, thus emphasizing the *group,* and not the last one counted. This counting may be varied by using nickels, dimes, inch-cubes, and the like, and by making the groups to be counted irregular in shape, by counting in order and counting by skipping about; that is, by having count "two" fall on an object not adjacent to count "one."



Suggestions for further help to the child in counting and adding:

(1) The teacher or mother can create opportunity for measuring with definite measures, as a foot, an inch, a yard, an hour, a day, a minute, a penny, a dollar, a dime, a pound, a quart, and others. Much of the early number work should grow out of concrete conditions and be dealt with through definite units of measure, both at home and at school.

(2) The child may measure the table, the floor, the height of members of the family, his blocks, his playhouse, the length of his and his friends' jumps or throws, the top of his desk and of his teacher's desk, the blackboard, the cardboard he uses in construction work, his school garden, his own space in it, etc., using the yard, foot or inch, as his distances are long or short.

(3) He counts, as he measures, the number of yards, or feet, or inches, in the lines measured.

(4) He may add to find the perimeter of

PUPIL MEASURING TEACHER'S DESK

table (distance around), room, rug, cardboard, desk, garden, etc. For example, he finds a rug 2 yds. long and 1 yd. wide, and adds: 2 yds.+2 yds.+1 yd.+1 yd.=6 yds., or measuring it in feet, he adds: 6 ft.+6 ft+3 ft.+3 ft.= 18 ft. The floor gives larger numbers; the length may be 19 ft. and the width 15 ft.; his problem then is 18 ft.+15 ft.+18 ft.+15 ft.= 66 ft., or 6 yds.+6 yds.+5 yds.+5 yds.=22 yds.

(5) For this the child should have a foot rule and a yard rule, both marked off clearly in inches, and the yard marked clearly in feet. In this repeated measuring and counting with definite units of measure, the child comes to see that a sum is made up of two or more quantities which have the same measuring unit. This is said commonly in the familiar phrase, "Only *like* things can be added."

(6) With these and a good measuring tape, the measuring may extend into the yard, the farm, the playground, the school ground, the city block, and so on to any region of interest to the child.

MEASURING THE GARDEN

Such work gives excellent opportunity for the child to master the simple *number* in the life about him. At this stage, the home offers opportunities for work and material which the child cannot have in school for lack of individual help, chance for freedom of movement, for expression of results and for discussion of his own interesting methods. The data secured gives the child his own material for counting and adding. Indeed, it keeps him at work helping himself, with now and then a suggestion from teacher or mother, which is the most desirable condition for school or home work. The large classes in school are somewhat prohibitive of this desirable method of individual effort. Here the home has a great advantage and should furnish much raw material for the school.

Another set of suggestions: The play or work with real money is most enjoyable and most generous in its results at this state; children like it greatly. Many teachers use money made by themselves or by the children, or manufactured in bulk for the purpose, but there is a joy of response to the real money which is lacking in the effect of the imitation. The child knows the one has value while the other has not, and even allowing for the generous imagination of the child, the real money adds zest to his problem.

(1) If the teacher can have on hand pennies, nickels, dimes and dollars, that the child may handle, count and add, his joy and progress will give return in full measure.

(2) Let child and teacher buy and sell to each other.

(3) Let the teacher or mother tell him what she has spent or must spend for bread, meat, butter, berries, etc., while he sets aside the amount of real money for each article; then sets down the column to be added, not writing the name of the article bought, which is too laborious at this time, nor the dollar sign nor decimal point, but in this form:

15
40
37
15
107

This he sees is 107 cents, and from the money he has set aside, he sees it is $1.07.

(4) Then the question is asked, "How much have I spent at the store?" "Show it to me in pennies." "In dimes and pennies." "In any other way you can." Out of this kind of work can grow innumerable problems, not only for the young child, but for older children, at home and at school. The home has much material at hand which the school should call for, asking the child to furnish good, live material for class work.

(5) If there are a garden, cows, chickens, etc., the small child may count the radishes, the heads of lettuce, tomato plants, eggs, pints or quarts of milk and so on; count by ones and in groups. Compute the value of this produce for home use, or what it brings when sold, for the week or month or season, somewhat as follows: In one week mother sold eggs for $3.25; lettuce $0.45; butter $4.00; cream $0.80; radishes $0.42. Use another series to represent another week. Let the child find the sum for first week, second week, and so on, keeping account for many weeks. Even a small child can do this if the account is not complicated, and his interest is renewed each week or each day so that he remains awake to his *growing* problem. Each problem must be simple, and the old problem should be recalled by having his old paper kept and brought out each stated time, day or week, or whatever the period may be, until he has accomplished his big problem. The mother must not force it too far. But such a big, far-reaching problem in the economy of the home will give him an inspiration and a respect for his study of arithmetic, especially if the teacher makes this home problem an integral part of the child's class

work. Here he sees the relation of arithmetic to real home conditions. Getting data at home for class work in school should be a large part of the "home work" in arithmetic.

THE GROCERY BILL

Some explicit suggestions for the work in addition:

(a) Grocery order for the day, week, month; find sum.

(b) Bills for dry goods at each buying, for week, for month.

(c) Sum of school purchases for all the children of family for day, week, and so on.

(d) Money earned by father and other members of family in a day, a week, a month.

(e) Expense of keeping pets.

(f) Cost of milk and cream for week, or period for which bill runs.

(g) Cost of a meal.

(h) Length of block from length of lots.

(i) Finding number of plants in a bed by adding the numbers in the various rows.

(j) Find value of products sold by father in city office or on farm, father giving sales data.

(k) Adding distances traveled each hour or day in automobile.

(l) Keep account of sales by mother, of chickens, eggs, butter, vegetables, turkeys, and so on, mother giving data.

(m) Counting shade trees, fruit trees, number of elms, oaks, poplars, apples, cherries, peaches, and seeing that the groups added make the whole number counted. The data for these problems is found in the home, and used either in school or at home.

(n) Add 5 to each of the following: 1, 4, 6, 7, 9, 8, 4, 3, 7, 2, 5, 9, 6, 8, 5. Add 8 to each. Add 7 to each. Begin at left, at right, at any point. Place in a column thus:

$$8+\begin{Bmatrix}1\\4\\6\\7\\8\end{Bmatrix}$$

Add both ways 8+4, 4+8. There is much variation possible in this kind of exercise for review, slow and rapid. Draw arrow and give answer without saying 8+1=9. The eye sees 1, 8 as 9; 4, 8 as 12. Counts by 2's, 3's, etc., starting at 0, 1, 3, 20, or elsewhere.

(o) See how far the child can get in ten seconds, thirty seconds, one minute and so on. Set a series of such problems, as, "Begin with 3, and add 4's, stop between 40 and 50. Begin at 1 and add 9's, stop between 70 and 80. See how many he can get right in one minute, three minutes. Do not extend the time too long.

Further Suggestions. The exercises can be varied by use of the following examples, and others like them:

$$\begin{Bmatrix}1\\4\\6\\9\\7\\2\\8\\9\end{Bmatrix}+8 \qquad 7+\begin{Bmatrix}5\\3\\6\\7\\3\\2\\6\\5\end{Bmatrix}$$

(a) Give *answers* only.
(b) Say 7 and 5 is 12.
(c) Write 7+5=12.
(d) Say 7 plus 5 equals 12. Vary the way of doing it.

Place sum below

6	7	3	9	4	2
+7	7	7	7	7	7

Place sum below

9	3	5	6	9	3	5
+8	8	8	8	8	8	8

$7+n=9$
$n+7=9$
$6+n=9$
$8+n=9$
$n+6=9$
$n+8=9$

(a) Say 7 and 2 is 9.
(b) Write 7+2=9.
(c) Say 7 plus 2 equals 9. Vary the way of saying it.

$9=n+8$
$9=7+n$
$9=4+n$
$8=6+n$
$8=5+n$

$n+n=16$
$n+7=16$
$n+9=16$
$9+n=18$
$9+n=17$

$$\begin{array}{r} 6 \\ n \\ \hline 15 \end{array} \qquad \begin{array}{r} n \\ 8 \\ \hline 17 \end{array}$$

The child must erase n, and put the correct digit in its place.

3	13	23	33	43	53
+5	5	5	5	5	5
8	18	28	38	48	58

7	17	27	37	47
+8	8	8	8	8
15	25	35	45	55

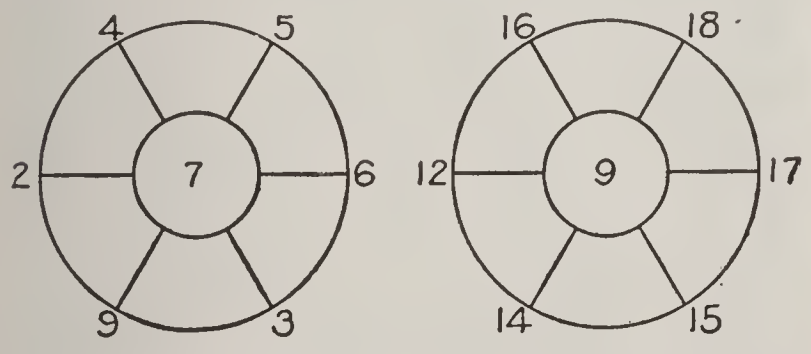
$$\begin{array}{r} 47 = 40 + 7 \\ +69 = 60 + 9 \\ \hline 116 = 100 + 16 \end{array} \qquad \begin{array}{r} 158 = 100 + 50 + 8 \\ +223 = 200 + 20 + 3 \\ \hline 381 = 300 + 70 + 11 \end{array}$$

Teacher points to any number and child gives sum of it and all numbers above it or below it in the column; for example, point to 2 in the column and child gives sum 17. The numbers may be simple at first, and be made more and more difficult and square be made larger. Teacher may vary her question; for example, ask the sum of the number pointed to and the one above it, also the two above it.

6	5	4	9	8	2
9	3	1	6	5	7
2	4	7	8	6	4
6	1	4	2	9	3
9	2	8	1	8	5
7	3	5	6	7	6

6	9		4
8		3	5
	6	4	7
4	3	5	

Fill each space so that the horizontal row will give the sum 20. Add horizontally and vertically and see if sums for entire square agree.



In the first circle give sum of center number and each number on circumference; for variation, write the sum on line. In the second circle give the number which added to center number makes the number on circumference; write it on line.

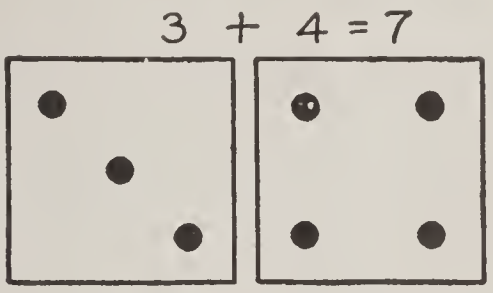
Add horizontally and vertically:

$$746 + 9237 + 4826 = \text{———}$$
$$647 + 7239 + 6482 = \text{———}$$
$$467 + 9327 + 8462 = \text{———}$$
$$923 + 4679 + 7869 = \text{———}$$
$$\overline{\quad} + \overline{\quad} + \overline{\quad} = \text{———}$$

This is good practice and carries a *test* with it.

Games That Make for Interest and Quick Response. 1. Dominoes painted on paper or cardboard. Children "match" ends. Find all that are alike. Find groups that make 7, 10, 8, and so on.

VISUALIZING ADDITION

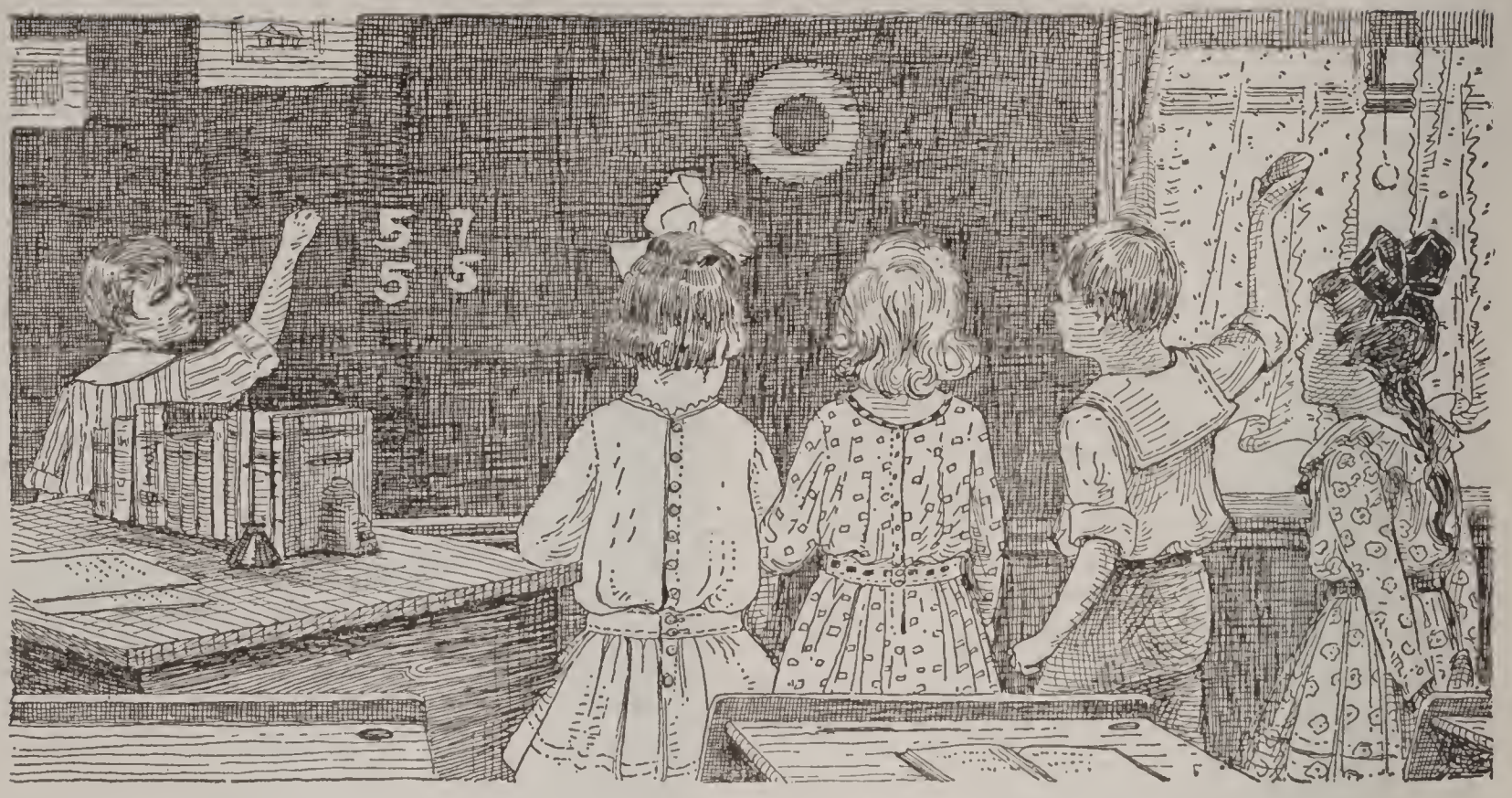


2. Children throw ball or bean bag, trying to hit inside circle; 10 points are given for each successful throw at small circle, and 6 for striking inside of large circle. Children take sides, keep tally, and see which side wins. The credit may vary, as 7 for small and 5 for large circle.

3. Class may take sides for *number card* game. Teacher holds up card such as those

NUMBER CARDS

illustrated—each for an instant. The child who answers correctly gets the card. The side that has the greater number of cards wins. This game may be played without taking



BEAN BAG GAME

sides; then the child having the greater number of cards wins.

4. To keep the see-saw balanced what must *n* be? The teacher draws the sea-saw

SEE-SAW

on the board; changes one or both numbers when child has substituted correct digit for *n*.

Sources of problems in addition found in current literature, connecting arithmetic with geography, history, study of social conditions, civics and "current events":

1. Products of the country given in quantity and value; wheat, corn, oats, potatoes, hay, meat, butter, eggs, flour, cotton, coal, lumber, iron, steel, and so on. These appear in various ways; for example, they may be given yearly over a period of twenty years. Child adds to find for a period of 5 years or 10 years, or 15 years, and so on.
2. Exports are given in same way.
3. Acreage devoted to various products in different states. From this the child finds area in certain sections or in the whole country, given over to wheat, cotton, etc.
4. Areas of states given. Child finds area of a given section; for example, the Middle West.
5. Population may be added in the same way.
6. The same material is given concerning foreign countries.
7. Imports to the country.
8. Immigration covering a period of years.
9. Health statistics.
10. Tax statistics.

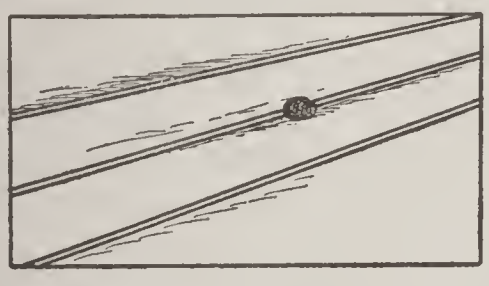
Suggestions for self help. The child may set down problems for himself, and he may vary his columns. Let him write, "long, narrow" columns, "short, wide" columns, "long, wide" columns. Let him use tests suggested further on in this article. He may time himself, seeing how many problems he can do in a minute, in three minutes, five minutes. If there are two or more persons working together, zest is added as to accuracy and time.

SAND TABLE

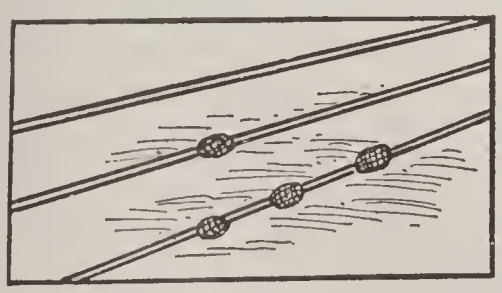
Processes of Addition. The above are suggestions as to conditions that give rise to problems in addition, and develop keen interest for mathematical values. What immediately follows will deal with the *process* of addition. In the early days of the work, the numbers

are kept small, and the combinations up to ten are seen and mastered, but this period must not be made too long. Adults incline to linger too long here because of their consciousness of the decimal notation (see NOTATION), and the written form due to that notation. The child will not hesitate long before 9 and 10 or 10 and 11. He waits only to get a name for his new number. Give him the earliest opportunity to play the game the race has played in its most serious computations—the game on the sand table. The pupil himself cannot built the sand table. The adult who does it need not produce the most finished piece of work. The child will be as well pleased and will be fully as well instructed if he has access to something which will merely hold the sand. He can have his sand pan in the schoolroom or in the playroom at home or out in the yard. The sand pan prepared, he must gather some small stones. Now he is ready for the game, and he will play it with as much pleasure as profit.

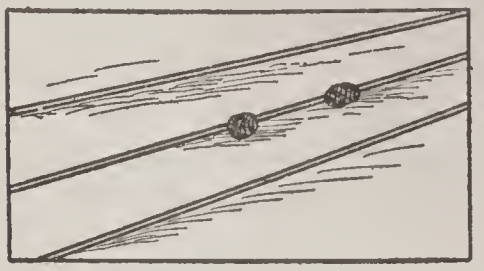
Teacher or mother counts pennies, dollars, eggs, plants, minutes, children, desks. The child puts down a small stone as a counter for each count the teacher or mother makes. When he has 10 stones in his first furrow, the teacher tells him to take them all up in his hand, and put *one* in the second furrow, thus:



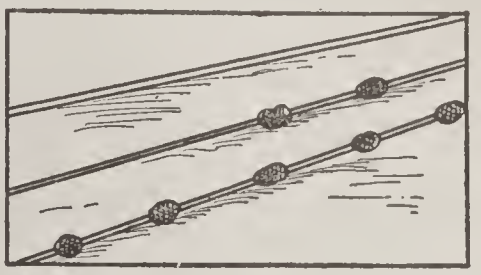
She tells him that that *one* means one ten, that it is the same as ten in the first furrow. Then start anew taking out this last stone. Teacher starts to count; the child puts down a stone for each count, and when he reaches 10, he makes the change as above, but this time the teacher goes on counting and he puts 1, 2 or 3 stones in the first furrow so his sand table looks like this:



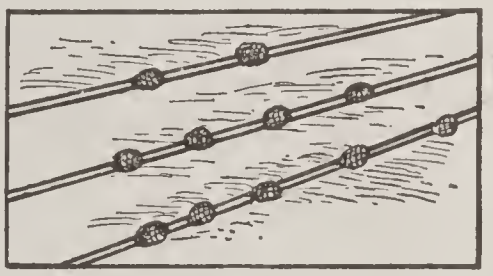
Do it again and have 4, 5 or any number up to 9 in the first furrow. After much of this, the teacher goes on counting until the child has dropped 10 counters in the first furrow a second time and the child makes the change and his pan looks like this:



She goes on until he has several counters in the first furrow, and his pan looks like this:



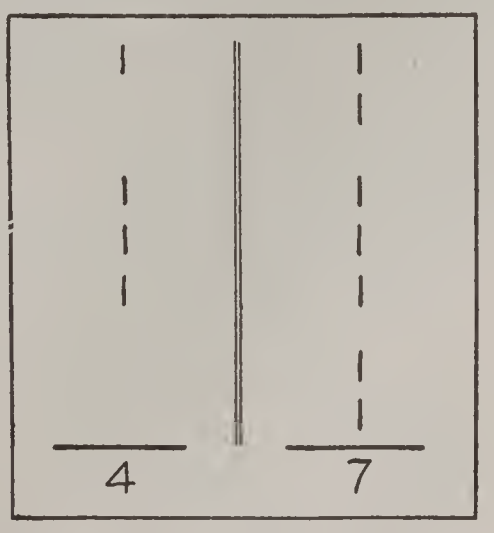
This is great fun to the child, and through the very concreteness of it and the joyous repetition of it he gets hold of the meaning of the decimal system of notation. It must be carried into hundreds when he is ready for it, with many repetitions, as with the tens. Let the child show his teacher and other members of the class numbers represented on his pan, and see if they can read them; for example:



Then let members of the class give him numbers to represent on the pan, and let them use the stones to represent numbers which he is to read. But adults must be careful not to hurry him here. He must have time to see it all. Beads may be used instead of stones. The sand pan exercise is excellent work at home, the mother or father and older members of the family playing the "game" with the child. Children up through the third and fourth grade will be helped greatly by it and see and understand the number system, and the older members of the family will play the game with zest.

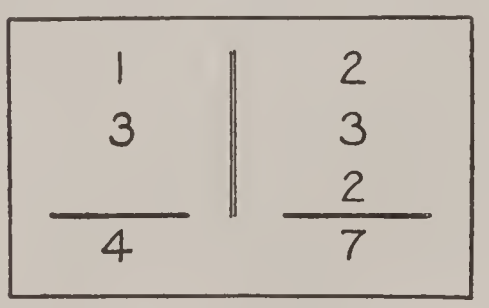
At first he reads a number as one ten and two ten and seven, ten and three; later twelve, seventeen, thirteen, and so on. He will see and hear the three and ten in thirteen, seven and ten in seventeen, two tens in the word twenty, three tens in the word thirty, up through the nineties (see NOTATION). From

the sand table the transition is made easily to columns on large paper or on blackboard; dots or tally marks with pencil, charcoal or chalk take place of stones. The paper or board appears like this:



Here the digits are used only to show the *sum.*

Then follows the use of the digits in the columns also, thus:



This is the natural course of progress, as we trace it through the centuries, the mind of the race using counters to perform simple or difficult operations, and the symbols to express and hold the results. We find the European far down into modern history doing this, and to-day we may watch the Chinese and the Japanese using the counter (the abacus) and setting down results with symbols. (See ABACUS.) Finally comes the column idea, without marks of separation, and with this the need of some sign to show that a column is empty. When he writes 6 tens and 4 ones he has 64, but when he writes 6 tens and has no ones, he must have some sign to hold the first column. The zero may be given him immediately or he may invent something for himself. The dot, the triangle and sometimes the polygon were the devices used where zero (0) is now used. Now the child has "place value" clear. For further discussion of this, see NOTATION. He now writes as follows and combines, using the dot:

46	
24	
12	
.	
82	

He sees 4+6 as 10; he puts a dot or a small 1 in tens column for each 10 he finds in units column, and puts 2 in units place in the sum. He has 8 tens and 2 ones, or 82. Here follow several similar problems:

23	17	16
12	23	4
55	38	23
.	12	18
90	.	.
	.	.
	90	61

They should also appear in this form:

23	17	16
12	23	4
55	38	23
10	12	18
80	20	21
90	70	40
	90	61

And also in this form:

23	17	16
12	23	4
55	38	23
80	12	18
10	70	40
90	20	21
	90	61

In the above the child adds either column first and writes its sum, and then adds the other column and writes the sum, and adds these sums. Through this comes a thorough understanding of the meaning of each number, and of the meaning of a sum. There are just so many *tens* and so many *ones,* and he reduces and reads as *ones;* for example, problem 3 is 4 tens and 2 tens and 1, or 6 tens and 1, or 61.

With older children this method of adding the columns in any order and putting down the partial sums and then getting the total is an excellent help to good understanding of number and a good method of testing one's own work in addition. To illustrate:

65	65	65
349	349	349
785	785	785
99	99	99
478	478	478
1400	36	1776
340	340	
36	1400	
1776	1776	

For drill in addition let the child make up columns to be added. Instead of depending upon mother or father or teacher to "mark them," let him learn to depend upon his own testing.

Tests. Let him add from the bottom, from the top, separate about at the middle and add both parts. Add as above, adding any column first, as hundreds, and put down the sum in full, as 1400; then tens and put down 340, and so on. Then get the total by adding these partial sums. Children enjoy this test better than those in common use. Use the test "casting out nines" (see *Casting Out 9's,* under NUMBER). The *testing* habit is an excellent one, but the habit of adding correctly is more excellent. Below are suggestions concerning the latter:

Rapid adding is desirable, and much stress is laid upon it at school and at home. But remember, adding loses as one adds too rapidly or too slowly, because—

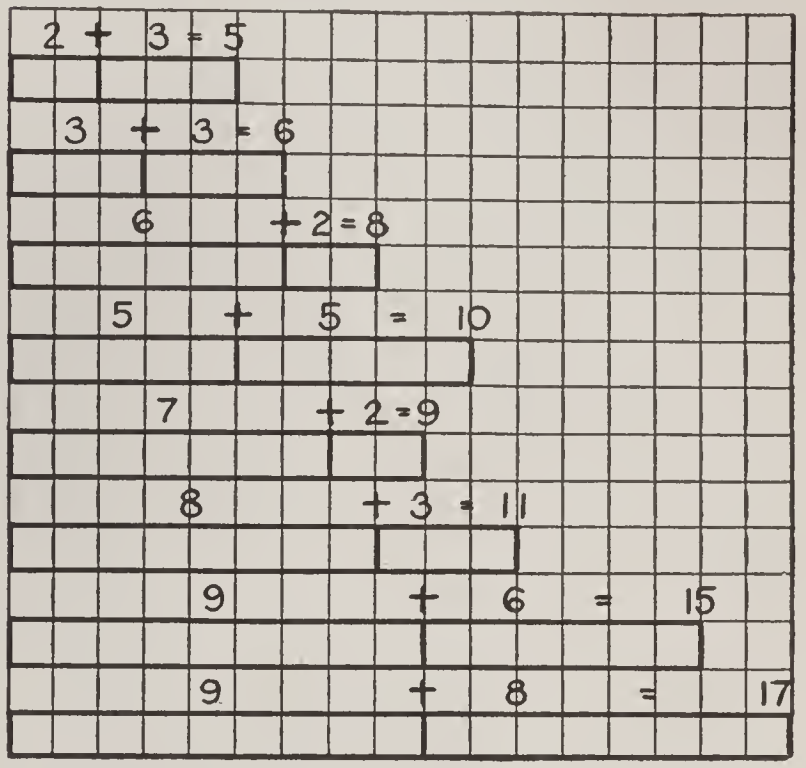
In adding too rapidly the mind fails to get sufficient hold upon the last sum and the new addend—or "fails to motorize" these two points. This causes a feeling of insecurity, and failure results.

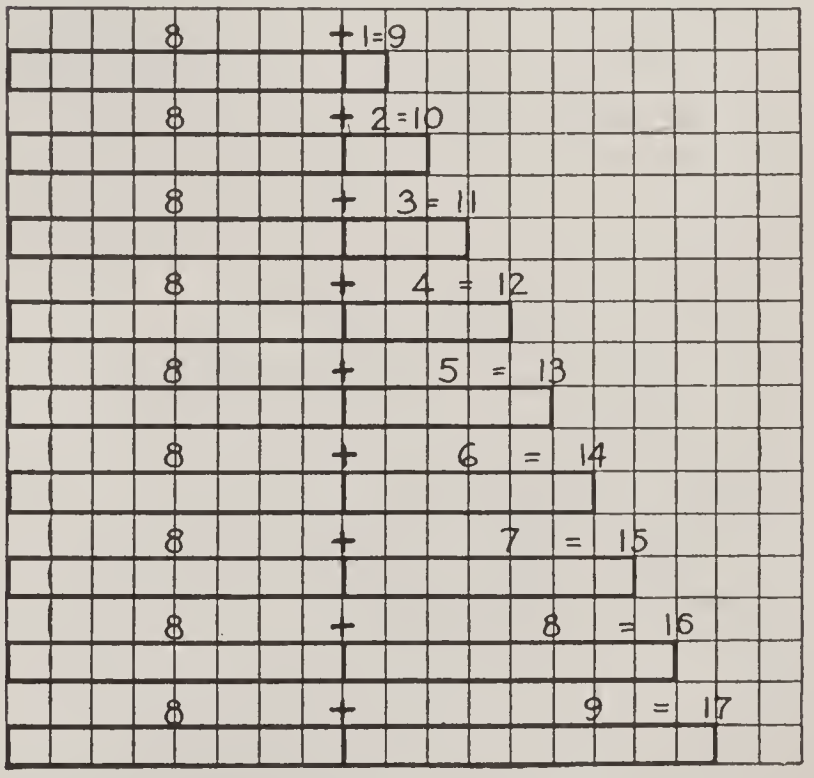
In adding too slowly the mind wanders between the parts of the process and failure ensues. So the element of speed must be considered from the standpoint of the mind of the learner, or the teacher defeats her purpose.

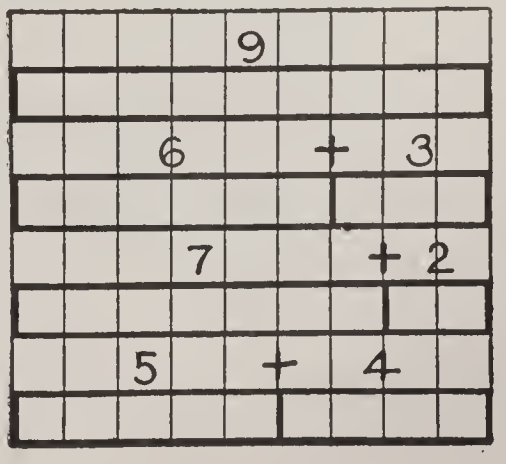
Some experiments made recently seem to indicate that combination of any kind in the column, as finding 10's (which is common), seeing a number of 8's, or 7's, etc., is not a help, that those who add straight on without this have advantage as to speed and accuracy. So one must not "impose his combination upon another mind."

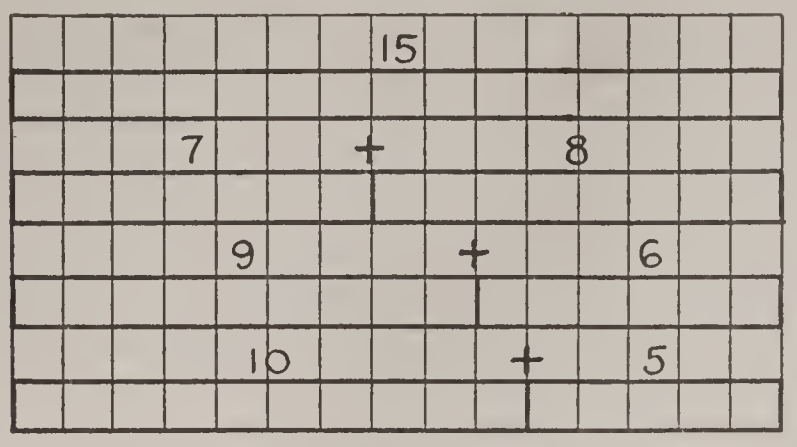
Of course this latter does not apply to the young child learning the notation; he must find the 10's and continue such finding until he has a clear understanding of the notation.

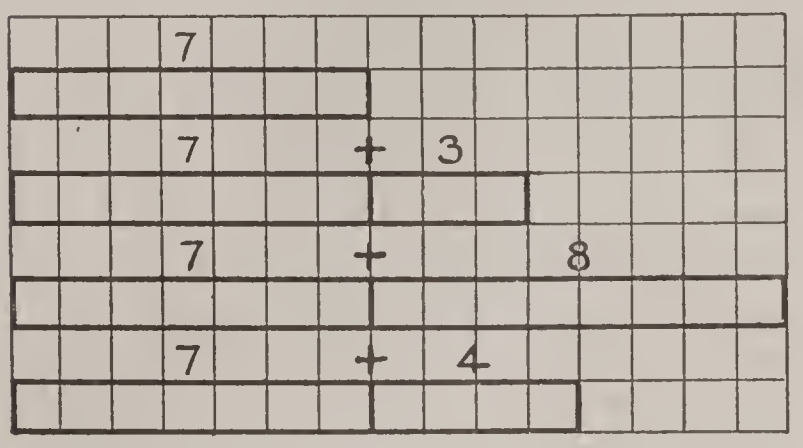
Helps in Getting Control of Addition. 1. Each child should have a large box of inch-cube blocks for number work at home and at school. Make the various combinations of addition with inch-cube blocks; put them in "table" form sometimes, make all combinations many times. Use paper counters for this also, but children like best to handle blocks. Later use squared paper (which can be purchased at school supply stores). On this the child draws the combinations and has a somewhat permanent picture of his work. It is this permanency which makes squared paper desirable. He cannot keep his "tables" in blocks or counters, for they occupy too much space. The *paper* can be kept and referred to for review at any time. To review addition, combinations from squared paper have the advantage over the written tables—namely, the child sees each combination as he looks at the paper. For example, in this written table he reads 8+7=15. On the squared paper he sees 8 squares+7 squares is 15 squares, and sees 7 squares+8 squares is 15 squares. A glance at the tables of 8's shows how clear this computation, (8+7=15), (7+8=15), is made by the squared paper.











This repeated seeing of sums is most valuable at all stages; it is vital in the early stages of addition.

The following groups are types of excellent exercises:

36=30+6
48=40+8
75=70+5
19=10+9

28+8=20+16=36
46+9=40+15=55
87+7=80+14=94

Then follow with this, which is excellent preparation for subtraction:

36=20+16
55=40+15
94=80+14

75=60+15
92=80+12

Add without pencil in this way:

24+32=50+6
35+14=40+9
36+23=50+9

68+45=100+13
94+31=120+11
78+84=150+12

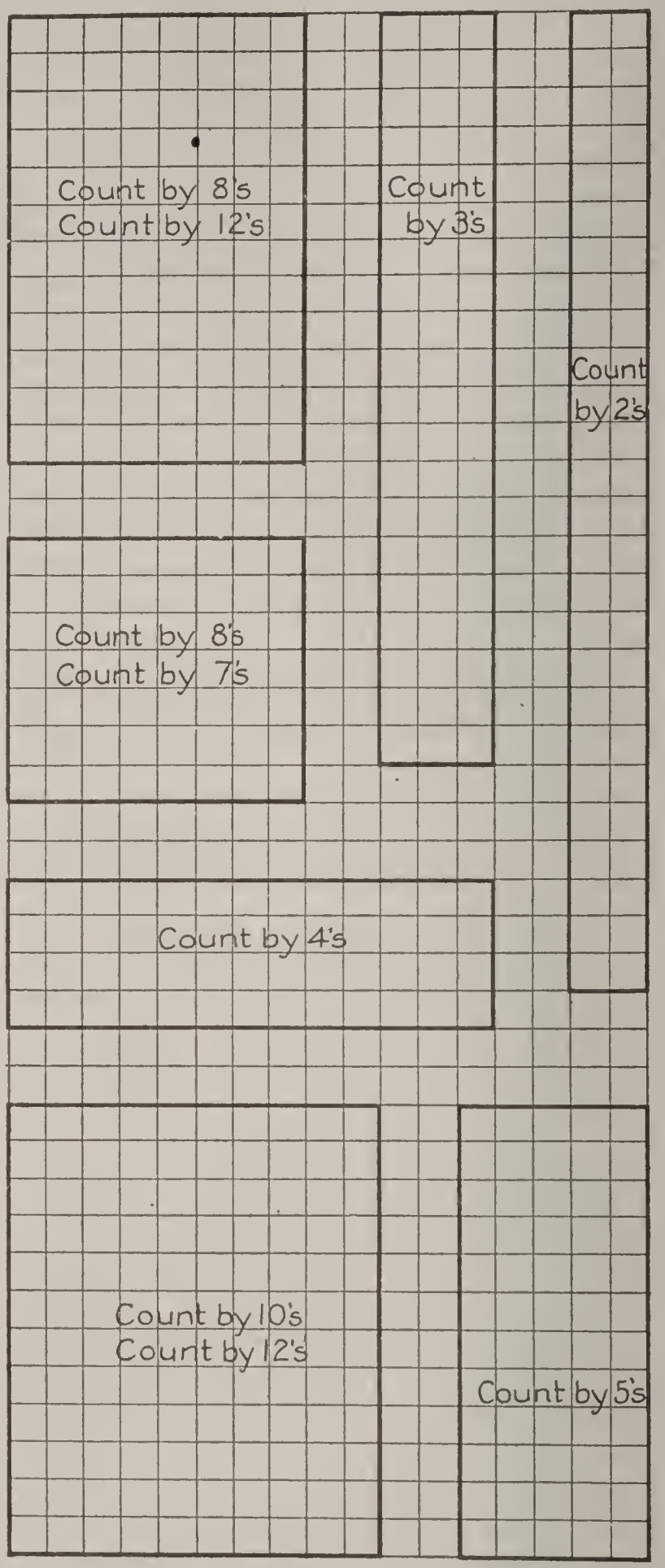
This is productive of the wide-awake effort and excellent control and accomplishment.

Some Methods of Addition. *Civil Service Method.*

3245	32=sum of units
837	14 =sum of tens
6248	18 =sum of hundreds
27	9 =sum of thousands
615	10972

This is like the method used above for children, but the zeros are not used. According to that method, the sums would appear—

32
140
1800
9000
10972



Banker's Method.

3245	32
837	17
6248	19
27	10
615	
	10972

Here the number to be carried is added to the next column but still appears in the first partial sum; for example, 3 is added to 14, giving 17, but still appears above 7. The answer is read at *sight;* it is the last addition

and the last figure in each partial sum. This addition usually appears in the Banker's Method, thus:

32
17
19
10
10972

and the sum is read as the last sum set down and the units digit in each of the other sums.

The Group Method varies with individuals. Many group in 10's:

68
23
74
92
63
320

In first column (3, 4, 3=10) (8, 2=10), 2 is added at top of ten's column and taken from 7 and added to 9, and the addition continues 20, 26, 32.

Others group in groups of two or three or more numbers in a column as—

68
23
74
92
63
59
93
47
28

Others look for a number of 9's or 8's or 7's, and so on, and cast about to make them. Here they see 9, 7+2, 8+1 in units column and 9, 5+4, 2 in tens column.

48
57
41
36

They might look for 8, 7+1, 6 or 6+1, 7, 7, 1; and 4+4, and 5+3.

Group adding varies almost with the individual. Adding two or more columns at the same time is accomplished by cross addition, varying with the individual, as in the following:

46
35
73

73+5+30+6+40=154
or
70+30+8+6+40=154

462
356
174

174+6+50+300+400+60+2
174, 180, 230, 530, 930, 992

A.H.

Outline on Addition

1. Definition
   Short method of counting
2. Early steps
3. Errors to be guarded against
   (a) Thinking of numbers as names
4. Measuring with definite measures
5. Concrete conditions necessary
6. Use of home material
7. Use of real money
8. Addition taught by means of games
9. Addition correlated with geography
   (a) Problems relating to products of country
   (b) To exports
   (c) To area
   (d) To population
   (e) To imports
   (f) To immigration
   (g) To other statistics
10. Processes
    (a) Decimal notation
    (b) Addition of tens
    (c) Addition of hundreds
11. Tests
    (a) Partial sums
    (b) Casting out nines

ADDRESS', FORMS OF. The forms used in addressing persons who hold titles of nobility or offices of dignity are more rigidly observed in monarchies than in countries under a republic form of government. The Constitution of the United States forbids the government to grant titles of nobility, or officials of the government to accept them from foreign States, but custom has sanctioned certain forms of address for the President, Vice-President and other officers of dignified position. The following list includes the more important forms:

Ambassador: His Excellency, the [French] Ambassador. A United States ambassador to a foreign country is addressed as "Hon."

Archbishop: His Grace, the Lord Archbishop of ———. Letters begin "My Lord Archbishop."

Cabinet Officer: The Honorable the Secretary of ———; The Honorable the Postmaster-General, etc.

Countess: The Right Honorable the Countess of ———. Letters begin "Madam," and address her as "Your Ladyship."

Duke: His Grace the Duke of ———; addressed personally as "Your Grace."

Earl: The Right Honorable the Earl of ———, if a member of the Privy Council; addressed personally as "Your Lordship."

Governor: In Massachusetts by law and in other states by courtesy this official is addressed as "His Excellency the Governor of ———"; "The Governor of ———"; or "Hon. ——— ———, Governor of." He is formally spoken to as "Your Excellency."

King: The King's Most Excellent Majesty. Letters begin "Sire" and address him as "Your Majesty."

Pope: Letters are addressed "His Holiness, the Pope," or "Our Most Holy Father. Pope ———." Letters begin "Most Holy Father."

President: Letters are addressed: "The President, White House"; or "The President of

the United States, White House," or "His Excellency the President of the United States." Letters begin "Mr. President."

Prince: "His Royal Highness, Prince of ———"; or "His Royal Highness, the Duke of ———." Letters begin "Sir"; he is referred to personally as "Your Royal Highness."

Queen: The Queen's Most Excellent Majesty. Letters begin "Madam" and address her as "Your Majesty."

Supreme Court, Chief Justice: Letters are addressed "The Chief Justice of the United States"; or "The Honorable ——— ———, Chief Justice of the Supreme Court of the United States." Letters begin "Mr. Chief Justice," or "May it please your Honor."

Supreme Court, Associate Justice: Letters are addressed "Honorable ——— ———, Associate Justice of the Supreme Court." This jurist is always referred to as "Mr. Justice ———."

Vice-President: Letters are addressed "The Vice-President"; or "The Honorable the Vice-President of the United States"; or "The Honorable ——— ———, Vice-President of the United States." Letters begin "Mr. Vice-President" or "Sir." B.W.

ADE, *ayd,* GEORGE (1866-), an American humorist and playwright, known principally as the author of a series of fables written in present-day slang, in which he combines racy wit with a keen insight into the failings of human nature. Ade was born in Kentland, Ind., and was educated at Purdue University. He began his literary work as a writer for newspapers in Lafayette, Ind., and in Chicago, where his clever sketches in the *Record,* entitled *Stories of the Streets and the Town,* won him a favorable reputation as a humorous observer of the every-day life of every-day people. His comic operas, *The Sultan of Sulu* and *Peggy from Paris,* and his comedies, *The County Chairman, The College Widow, The Slim Princess* and *The Fair Co-ed,* in some of which Elsie Janis starred, were popular successes.

ADELAIDE, the third largest city in Australia, capital of the original state of South Australia, founded in 1836 and named after the queen of William IV of England. It is situated seven miles from the ocean, on the banks of the Torrens River and is 508 miles northwest of Melbourne. The river, on the banks of which are beautiful parks, divides the city into North and South Adelaide, connected by five handsome bridges. The city is one of the most beautiful in Australia, with broad, well-kept streets, and many imposing buildings, among which the houses of Parliament, the town hall and the general post office are conspicuous. The city is governed by a mayor and six aldermen, and is the only Australian city in which the mayor is elected by the votes of all the tax payers.

The principal industries are the manufacture of woolen, iron and earthenware goods, and an extensive trade is carried on with the interior and with foreign countries. Most of its exports are sent to British ports, but the commerce with the United States is rapidly growing. Adelaide is the terminus of an extensive railroad system connecting it with Melbourne, Sydney and Brisbane. The climate is healthy, though excessively hot in the summer. The real commercial center is at Port Adelaide on the coast, the port of call for all European steamers, and a flourishing town with about 21,000 inhabitants. The population of Adelaide in 1921, within a radius of ten miles from the general post office, was 255,318.

ADELER, MAX. See CLARK, CHARLES HEBER.

ADEN, *ah' den* or *a' den,* a city and fortress in Southern Arabia, a British possession often called the Gibraltar of the East. It lies on the shore of the Gulf of Aden, near the southern end of the Red Sea. Ownership of Aden, together with the control of the Suez Canal, therefore gives Great Britain command of the short maritime route from Europe to India and the Far East. Only the ships of friendly nations may pass the frowning guns of the fortress.

Not only is Aden's position of strategic importance in a military sense, but also in a commercial sense. Its harbor is large and deep, and it is the most important of the coaling stations on the Suez Canal route. It has an extensive commerce, chiefly in coffee, hides and tobacco brought from the interior. The local control of the town and of an area of seventy - five square miles surrounding it is in the hands of a political resident, who is also the commander

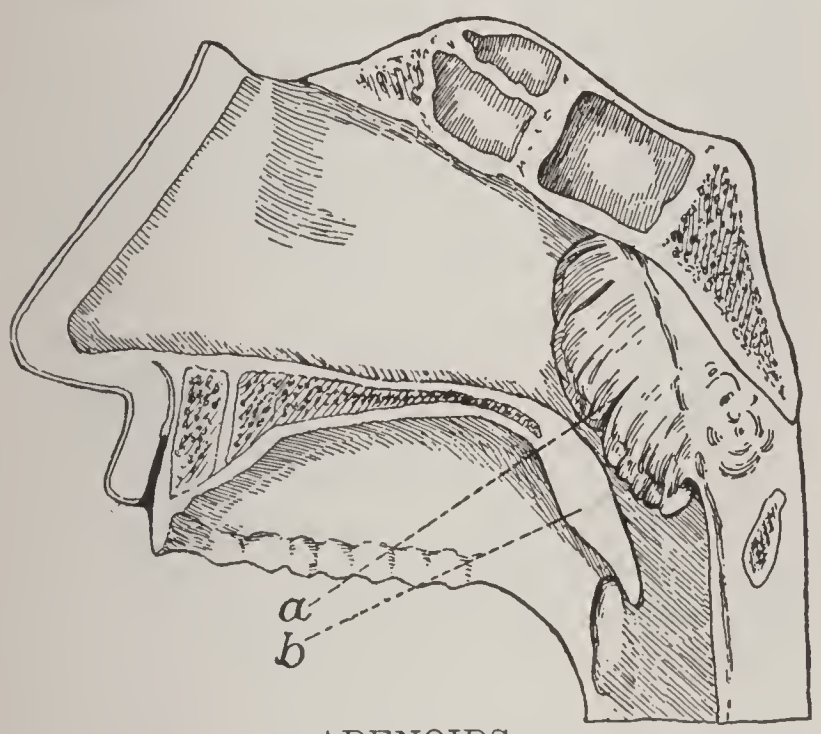
ADEN

This section, at the southern extremity of the Arabian desert, is almost rainless, hence all necessities of life must be imported.

of the British garrison. The territory of Aden is regarded for purposes of government as a part of the Indian province of Bombay. Population of the city in 1921, 54,923.

The GULF OF ADEN, on whose shore the city is located, is that part of the Indian Ocean extending westward to the strait of Bab-el-Mandeb, at the south end of the Red Sea. It is about 550 miles long, and has a maximum breadth of 250 miles.

ADENOIDS, *ad' e noyds,* an excessive growth of a spongy tissue in the space between the back of the nose and the throat. This growth obstructs the passage through which the air reaches the lungs, and breathing through the nose becomes difficult or impossible. But breathing through the nose is very important, for only in this way is the air purified of dust and germs before it reaches the lungs. On the other hand, the obstruction of the air passages prevents the proper expansion of the lungs and the development of the chest. Children suffering from adenoids have usually a characteristic facial expression, with open mouth and a staring, half-stupid look. They "catch cold" very easily, are hard of hearing and very often suffer from running ears. Such children sleep with the mouth wide open; they snore and are restless in their sleep. Mentally the child remains backward, is unable to concentrate his attention for any length of time, and is generally slow and dull. The presence of adenoids retards both the physical and mental development of the child. Children suffering from adenoids usually have enlarged *tonsils.*



ADENOIDS

The position of adenoid growth is shown at *a.* Figure *b* is the soft palate. The figure shows how the former crowds upon the latter.

Treatment consists in the cutting out of the adenoids. This operation when performed by a skilful surgeon is practically without danger. But it is not advisable to operate upon children who bleed freely from the nose or mouth. In the great majority of cases the removal of adenoids brings about in the child a very pronounced physical and mental improvement. The child starts to grow quickly, his chest develops, and he soon gains in weight and strength. W.A.E.

ADHESION, *ad he' zhun,* the physical attraction which causes one substance or body to remain attached to the surface of some other body with which it has been placed in close contact. Adhesion is one of the commonest properties of matter, and examples of it can be seen on every hand. It is by adhesion that the lead of a pencil sticks to paper, chalk to a blackboard, paint to wood and grease to an axle. The adhesive power of substances varies greatly, and in many substances may be increased by man. The adhesive power of glue or of a porus plaster, for example, is chiefly the result of special preparation. Whatever the degree of adhesion, however, force must be used to separate the objects.

Adhesion may exist between two solids, between a fluid and a solid, or between two fluids. This truth can be tested by a simple experiment. Almost any object placed in water, if removed carefully, will be found to have drops of water adhering to it. The adhesive power of most liquids is also shown by their tendency, when they are poured gently from a jar, to run down the outside of the vessel instead of falling directly, in obedience to the laws of gravity.

ADIGE, *ah de' ja* (German, *Etsch*), a river of Austria-Hungary and Northern Italy, rising in the Rhaetain Alps, and after a south and east course of about 180 miles, flowing into the Adriatic Sea. Its total length is 230 miles, of which 170 are navigable, though with difficulty. The Adige valley was the scene of severe fighting in the early days of 1915 in the War of the Nations, between the armies of Italy and Austria.

ADIRONDACK MOUNTAINS, a group of mountains occupying a considerable section of Northeastern New York, constituting one of the most attractive sections east of the Mississippi River. They lie within what is known as the Adirondack Province, a great stretch of wild and rocky country, covering about 12,500 square miles north of the Mohawk River. The highest peaks are for the most part in

Essex County. By some authorities the Adirondacks are considered to be a part of the Appalachian highlands, but others regard them as an independent mountain system. The highest peak, Mount Marcy, rises to an altitude of 5,344 feet; Mount McIntyre is but 232 feet lower, and Haystack, Dix, Whiteface, Giant and Skylight mountains are all over 4,500 feet high. Famous among the lakes of the range are Champlain and George.

The rugged beauty of the Adirondacks, with their numerous mountain lakes and great forest areas, attracts each year large numbers of automobile tourists, and in the summer season there is much travel on the improved highways which have been constructed by the state and various counties. Sportsmen, too, find this a very attractive region. About half of the range has been constituted a state park, partly to preserve the natural beauty of the mountains, and partly to conserve the rain waters and the moisture of melting snows, for when the hillsides are denuded of their forest coverings, the waters run down to the streams and cause destructive floods. The state of New York has also set aside a portion of the Adirondacks as a forest farm, in connection with which is maintained the School of Forestry of Cornell University. These mountains contain deposits of iron ore and building stone, and their timber is utilized by the manufacturers of paper-pulp. T.E.F.

ADJECTIVE. Our word *adjective* is derived from two Latin words, meaning *added to.* An adjective is a part of speech which, added to a noun or pronoun, makes its meaning clearer and more definite. It is said to *modify* or *limit* the noun or pronoun, since it makes its application more specific, less general. Thus, *country* has a world-wide interpretation, but by prefixing the adjective *cold* we limit its meaning to countries outside tropical and sub-tropical latitudes.

If the adjective answers the question *What kind?* with reference to a person or object, it is a *descriptive,* or *qualifying, adjective.* If it merely points out without describing, it is a *limiting,* or *definitive, adjective.*

Descriptive Adjectives. It is the descriptive adjectives that are most numerous and that give color and variety to language. There are three classes, illustrated in the following sentence: "This bright, well-mannered lad is a typical American product." *Bright* and *typical* are *common adjectives,* modifying respectively the nouns *lad* and *product; well-mannered* is a participial adjective modifying *lad; American* is a *proper adjective* modifying *product.* In English all proper adjectives, like proper nouns, must be capitalized, although this is not the custom in many foreign languages.

Predicate Adjectives. When a qualifying adjective is used to complete the meaning of the verb *to be,* or such similar verbs as *seem, appear, become, look, feel, taste* or *smell,* it is called a *predicate adjective;* as, The poppy is *crimson;* he felt *sad;* the nut tasted *bitter.*

Adjectives as Nouns. A descriptive adjective may be used as the subject of a sentence by prefixing *the,* thus indicating a class; as, the *wise* are polite all the world over; the *busiest* can always find time for the odd tasks that the *indolent* refuse.

Limiting Adjectives. The two kinds of limiting adjectives are illustrated in the sentence, "The five officers made weekly reports to George the Third, confirming him in an absurd notion that too much liberty had already been granted." *Five, weekly, third* and *much* are all limiting adjectives denoting respectively number, frequency, numerical order and quantity. They are grouped under the general term of *adjectives of quantity. The* and *an* or *a* are limiting adjectives belonging to a special group called *articles, the* being the definite article and *a* and *an* the indefinite. See ARTICLE.

Pronominal Adjectives. Some grammarians class the pronouns *this, that, these, those, which, each, such, both, most, many, few,* and the like as *pronominal adjectives,* but it is generally considered simpler to treat them as *adjective pronouns.* See PRONOUN.

Position and Order of Adjectives. When it modifies a noun the adjective, unless used to complete the predicate verb, generally precedes the noun and is preceded by the article; as, an *agreeable* man. After *how, so* and *too,* however, the adjective follows the article; as, *How* agreeable *a* man; *so* agreeable *a* man; *too* agreeable *a* man.

Where there is a series of adjectives the one that is most closely connected with the object is placed next to the noun, while the others are arranged according to importance. Thus we say, The *little old* lady, not the *old little* lady; an *expensive new gold* watch, not a *new gold expensive* watch. If they are of equal rank, they are arranged according to harmonious sound, usually the shortest first.

There are some constructions in which, for purposes of emphasis, clearness, euphony or

rhythm, the adjective follows the noun; as, splendor *unsurpassed;* a pupil *ambitious* to excel; the child *asleep;* the victim *afraid;* everything *good;* nothing *useless;* Alexander *the Great;* notary *public,* and the like.

Used to modify a pronoun, the adjective follows; as, We came upon them, *weary and anxious.*

Comparison of Adjectives. In most languages the adjective changes in form to agree with the gender, person, number and sometimes case of the noun or pronoun to which it belongs. In English it has an invariability of form, the only inflection being for the purpose of indicating variation in amount or degree. This is called comparison.

Comparison by Endings. Words of one syllable and some of two which do not sound awkward in the inflected form, add the suffix *er* to the *positive* to form the *comparative,* and *est* to form the *superlative:*

POSITIVE	COMPARATIVE	SUPERLATIVE
neat	neater	neatest
dry	drier	driest
feeble	feebler	feeblest
lovely	lovelier	loveliest

Comparison by Adverbs. Most adjectives of more than one syllable, and all adjectives of participial form, are compared by prefixing *more* or *less* to the positive to indicate the comparative degree, and *most* and *least* to indicate the superlative:

POSITIVE	COMPARATIVE	SUPERLATIVE
active	more active	most active
enthusiastic	more enthusiastic	most enthusiastic
delighted	more delighted	most delighted
tired	less tired	least tired
willing	less willing	least willing

Irregular Comparison. About twenty common adjectives are irregularly compared; as, *good (well), better, best; many (much), more, most; far, farther (further), farthest; fore, former, foremost (first),* and others. For complete list and full discussion, see COMPARISON, where there will also be found a list of the adjectives that are absolute in meaning, not admitting of comparison.

Parsing the Adjective. To parse an adjective these three points must be stated:

1. Its *classification*—whether descriptive or limiting, and if the latter, whether an adjective of quantity or an article.
2. Its *degree of comparison*—whether positive, comparative or superlative.
3. Its *syntax,* or use in the sentence, which involves connecting it with the noun or pronoun whose meaning it modifies.

Type Sentences: The most important part of education is right training in the nursery.

The is a definite article, limiting in the one case the noun *part* and in the other the noun *nursery. Most important* is a descriptive adjective; superlative degree, comparison regular by adverb (*important, more important, most important*); modifies the noun *part. Right* is a descriptive adjective; positive degree, not admitting of comparison; modifies the noun *training.*

The two friends are devoted and inseparable.

The is a definite article, modifying the noun *friends. Two* is a limiting adjective, denoting number; modifies the noun *friends. Devoted* is a descriptive adjective, participial form; positive degree, comparison regular by adverb (*devoted, more devoted, most devoted*); used with the incomplete verb *are* to modify the subject noun, *friends. Inseparable* is a descriptive adjective; positive degree, not admitting of comparison; predicate adjective modifying the subject, which is *friends.*

Common Errors. Among the most frequent errors in the use of adjectives are the employment of the adjective for the adverb, the adverb for the adjective, and the placing of the adjective with the word denoting the quantity instead of the noun described. These and many other every-day mistakes are covered in the following examples, and in the list given in the article ADVERB.

Robert sings good, for *Robert sings well.* The reference is to the action of singing, and a verb always demands an adverbial modifier.

Robert looks badly, for *Robert looks bad. Looks* in this construction is an inactive verb expressing Robert's condition without reference to any action. This calls for an adjective instead of an adverb.

Robert looked close at the specimen, for *Robert looked closely at the specimen.* Here the action of looking is implied, which necessitates the use of the adverb.

Lavender smells sweetly, for *Lavender smells sweet.* What is meant is that lavender is *sweet.* It does not do any smelling; there is no action, therefore the adverb is incorrect. *Sweet* is used as a predicate adjective.

He was real sick, for *He was very sick. Real,* being an adjective, cannot modify another adjective. Besides, *real* does not indicate degree.

A strong cup of coffee, for *A cup of strong coffee.* The adjective should be placed next to the word it modifies. It is the coffee that is strong, not the cup.

The four first volumes, for *The first four volumes.* Only one can be "first," therefore there cannot be "four first." The expression *first four* considers the volumes as a group or unit.

You have grown considerable, for *You have grown considerably.* The adjective *considerable* cannot be used to modify the verb *have grown;* the adverb must be used.

I am afraid I can't locate the passage, for *I fear I can't locate the passage.* It is correct to say *I am afraid,* meaning *I am frightened;* but it is not correct to use the adjective with a fol-

lowing objective phrase. This construction demands a transitive verb.

Apples are healthy, for *Apples are healthful.* There is such a thing as a healthy apple, meaning an apple that is sound and good to the core, but the idea here intended is that a diet of apples will impart health, a meaning that is conveyed by the adjective *healthful.*

Of two evils choose the least, for *Of two evils choose the less.* This old proverb is generally incorrectly quoted. Where only *two* things are compared the superlative form of the adjective is illogical.

Most all the members were present, for *Almost all the members were present. Most,* being an adjective, cannot be employed as an adverb. Whenever *nearly* can be substituted, *almost* is the correct word to use.

I have received your last picture, for *I have received your latest picture.* It is not the last picture unless the subject is dying or has registered a solemn vow never again to sit for a photograph.

He is a new beginner, for *He is a beginner.* The adjective *new* is superfluous because the idea is bound up in the very meaning of *beginner.*

He is bound to go abroad, for *He is determined to go abroad.* The first form is only correct in the event that he is really bound by oath or contract to make the trip.

There were no less than thirty present, for *There were no fewer than thirty present. Less* is used for quantity, *fewer* for number, and where individuals rather than masses are implied, the latter is the proper adjective.

She is a nice girl, for *She is a charming or pleasant girl. Nice* conveys the idea of precision, as, *nice distinctions, nice choice of language,* and the like.

It is a universal, world-wide custom, for *It is a universal custom,* or *It is a world-wide custom.* Since the two adjectives convey the same meaning, one is redundant. This tendency to use superfluous adjectives is illustrated in such common phrases as *rich millionaire, two twins, habitual habit, verdant green,* and others of the same brand of wordiness.

Awful, horrible, frightful, mad, grand, gorgeous, elegant, splendid and others, carelessly used in everyday speech for less significant words. Care should be taken to avoid extravagant and inaccurate adjectives, since aptness is an essential of forceful language. L.M.B.

Outline on the Adjective

1. Definition
   (a) Used with noun or pronoun
   (b) Limits or modifies meaning
2. Classes of adjectives
   (a) Descriptive
   (b) Limiting
3. Positions and order
   (a) Modifying a noun
   (b) Modifying a pronoun
4. Comparison of adjectives
   (a) By endings
   (b) By adverbs
   (c) Irregular comparison
   (d) Adjectives not admitting of comparison
5. Parsing the adjective
6. Common errors

AD'JUTANT, a military officer, usually with rank of captain, appointed to assist the commanding officer in the discipline and training of his troops, and in the general administration of regimental affairs. In the United States army, regimental adjutants are appointed for four years.

Adjutant, the bird, is a species of stork, and derives its name from its dignified poses, which are supposed to resemble the strutting and pompous airs of a self-important young army officer. The adjutant bird is not found in Europe or America, but is common in India, the East Indies and other parts of Southeastern Asia. It stands about five feet high, and its outspread wings measure about five feet from tip to tip. The body is white, but the neck is flesh-colored, marked with black, and the wings and back are slate-gray in color. The bill and the neck are both long and seem almost too large for the body. The adjutant bird feeds on small insects, and is particularly fond of fresh meat, but also eats offal and the flesh of animals which have been dead a long time. It is an efficient scavanger, a characteristic which has led the government of India to protect it from hunters who seek it for its feathers. These are called marabou feathers in commerce, and resemble those of the true marabou (which see).

THE ADJUTANT

ADME'TUS, in mythology, the husband of Alcestis (which see).

ADMIN'ISTRATOR, a person chosen by a probate court to take charge of the property of a person who has died without leaving a will, or who has not named anyone as his executor. The closest blood relatives are given preference in the appointment of administrators, and creditors have the next right to consideration. In all his acts the administrator is responsible to the court for faithful performance of his duties. When a foreigner dies without leaving a will, the consul from his

country usually acts as administrator. The duties of an administrator are stated in a bond.

AD'MIRAL, the office of highest rank in the naval establishment of a country, except in England and Germany, where the admiral of the fleet has higher dignity. In the navies of all countries there are three grades in this office, admiral, vice-admiral, and rear-admiral. In the United States navy, however, the rank of rear-admiral is now the highest permanent rank an officer can ordinarily attain. The rank of *admiral* is given temporarily to the officers in command of the Atlantic, the Pacific and the Asiatic fleets; when they retire from the chief commands they resume their personal rank as rear-admirals. The rank of *vice-admiral* is given temporarily to the officers second in command of these fleets, but here again it belongs to them not personally but only by virtue of office. The admirals and vice-admirals are chosen by the President from the number of rear-admirals, varying from fifteen to twenty-five, on the active list. At the age of sixty-two years all officers are released from active service and are placed on the retired list. Rear-admirals are chosen from the list of captains.

Until 1915, when the present system was adopted, only two men, David Glasgow Farragut and David D. Porter, had ever held the rank of admiral in the United States navy. The special rank of *admiral of the navy,* a unique distinction, was created in 1898 for George Dewey; since, Benson, Gleaves, Rodman, Wilson, Coontz and Mayo have been ranked as admirals. Until 1915 no man had held the rank of vice-admiral since the death of Stephen Rowan in 1900. Coffman and Grant were appointed at that time. In 1917 William S. Sims, in American command in Europe, was made vice-admiral, with Jones, Williams and Rogers.

The admiral of the navy receives $13,500 per year; an admiral receives $10,000 and his rank compares with a general in the army; a vice-admiral ($9,000) ranks with a lieutenant-general, and the rear-admirals ($8,000) rank with major-generals. In addition to their salaries these officers receive small allowances, according to their rank, to provide for expenses. The officers of the United States navy receive higher salaries than the corresponding ranks in any other nation in the world. The British admiral receives $8,881; the French, $7,850; the German, $7,611; the Russian, $9,660; the Japanese, $2,988; the Italian, $3,474. See RANK IN ARMY AND NAVY. E.D.F.

AD'MIRALTY, in Great Britain, the department of government which is responsible for the management of the British navy. The powers of the admiralty correspond roughly to those of the Department of the Navy at Washington for the United States, or of the Naval Service at Ottawa, for the Dominion of Canada. These powers are exercised by a board, comprising five lords commissioners of the admiralty. Two of the commissioners are civil or political lords, while the other three are naval, or sea, lords.

In theory these five men as a body decide all important questions, but in fact the responsibility, and usually the decision, rests on the first lord, who is always a Cabinet minister. Winston Spencer Churchill and Arthur James Balfour are the best known of the men who have recently held this office. The first lord, like the other Cabinet members, is responsible to Parliament; and all the lords resign if the Prime Minister resigns. The first lord has general supervisory control, including also the management of finance, appointments and promotions. He is assisted by the junior civil lord, who attends to the accounts, the naval schools and hospitals and other details.

The actual control of the fleet is in the hands of the three naval lords, the first of whom is the active commander-in-chief on the sea. He manages the arrangement and distribution of the fleet, issues general orders, and is generally responsible for discipline and management. The second naval lord is responsible for the armament, marine artillery and allied branches, while the third lord is charged with the duty of securing stores and supplies.

Admiralty Law. This term is applied to the special body of law relating to ships and shipping. It takes its name from the fact that all disputes relating to maritime transactions were originally settled by the lord high admiral of the navy. It relates chiefly to such matters as actions to recover possession of a ship, actions for damages to shipping, salvage cases and assaults on the high seas.

The laws and procedure generally follow the practice of the common law, but are administered by special courts. In England the admiralty division is a part of the supreme court of judicature. In Canada the functions of an admiralty court were first exercised by the Supreme Court, but are now held by the Dominion Exchequer Court and a number of local or district judges in admiralty (for further details see CANADA, subtitle *Government*).

In the United States all admiralty cases are heard first in the Federal district courts, and appeal may be taken to the Circuit Court of Appeals and to the Supreme Court. W.F.Z.

AD'MIRALTY ISLAND, an Alaskan island, 80 miles long, located south of the capital city of Juneau. It runs nearly parallel with the mainland, from which it is separated by a narrow channel. It is covered with excellent timber, and is well watered. The few inhabitants are Indians and Eskimos.

ADOBE, *a do' bee,* a word of Spanish origin, applied to unburnt, sun-dried bricks used in the arid regions of Mexico and the Southwest United States, and also to the peculiar clayey soil from which they are made. When moist, the soil is very plastic and can be moulded into any shape, but when dry, adobe is almost unbreakable. This characteristic was recognized by the aborigines at an early date, and they not only made bowls, pitchers and other vessels from it, but shaped the muddy clay into bricks, which they laid out to dry in the sun. Adobe houses are common in Mexico and Arizona, even to-day. As they are cheap and easy to construct, they are used chiefly by the Mexicans and Indians, but many white people, who could afford other building material, prefer them because they are always cool, even in the hottest weather.

The process of making adobe bricks is simple. The wet adobe is shaped into bricks of various sizes, which are then baked by exposing them to the sun for ten days or two weeks. During this time they are turned every day. Bricks made in the same way were used by the ancient Egyptians and Babylonians, and were made by the children of Israel during their enslavement in Egypt.

ADOLESCENCE, *ad o les' ents,* the state or process of growing from childhood to manhood and womanhood. The term comes from a Latin word meaning *to grow up.* In law adolescence covers the period between the ages of fourteen and twenty-one years for boys, and between twelve and twenty-one for girls. During these years body and mind undergo important changes which may be classified as physical, intellectual, social and moral. In considering these changes one must remember that there is no distinct dividing line between childhood and adolescence—one period gradually and, so far as the child is concerned, unconsciously merges into the other.

Physical Changes. *Bones and Muscles.* In most children early adolescence is characterized by rapid growth of the bones and muscles, and the youth seems to grow tall over night. Because of this rapid growth, the muscles are soft and pliable, and can readily acquire any new movement. On the other hand, because of this immaturity they become fatigued with comparatively little exercise. The nerves do not develop as rapidly as the muscles and the youth finds it difficult, if not impossible, to gain complete command over his movements. For this reason the period of early adolescence is often called the "awkward age." The youth is "all arms and legs," and he does not know what to do with them. This awkwardness makes the youth extremely self-conscious, and any reference to his condition or movements is keenly felt and resented. Many a man and woman has incurred the lasting ill-will of a boy or girl by this sort of criticism.

Internal Development. The development of the internal organs is more marked than that of the bones and muscles and its influence extends to the intellectual and moral life. These changes are accompanied by extraordinary nervous excitement and pressure, and the system, like a pent-up volcano, is surcharged with energy that must find an outlet. Unless such an outlet is found along right channels, it may find an escape through avenues that lead to viciousness.

Mental Conditions. From twelve to fourteen in girls and from thirteen to fifteen in boys the powers of observation develop rapidly, memory achieves its highest activity and imagination reaches its normal stage, becoming very active in the fifteenth and sixteenth years. Judgment rapidly gains strength and reason begins to assume its sway.

In the stress and strain incident upon the development of the reproductive organs are born passions which the youth is often scarcely able to control. The selfish or self-centering feelings usually reach their height and begin to decline in the sixteenth year. Love of excitement is strong, and the individual will put forth the utmost energy in following those lines of activity which appeal most strongly to him. This is the age of "crazes" and we find the "reading craze," the "collecting craze" and numerous others particularly prominent. These are perilous years because passions are strong and the moral will is weak.

Moral Conditions. The moral judgment is influenced more largely by the custom of the group, by the standards established by previous training, and by the feelings than it is

by reason. This is the impulsive age, and the youth is prone to make moral decisions, which, after more careful consideration, he may regret. Self-hood is strongly assertive, and the youth keenly resents being treated as a child. It is difficult for parents to realize that their children have grown up, but failure to accept this fact and treat the youth accordingly is the source of many a heartache to fathers and mothers in after years.

During early adolescence the moral judgment of others is severe. From lack of experience the youth has little sympathy and he sees nothing lying between the breaking of a law and the punishment that should follow. He is equally severe in his judgment upon himself and often sees an impassable gulf yawning between himself and his ideals. Fortunately, however, his courage is good and his ambition unfaltering and he gradually overcomes the seeming obstacles that beset his pathway. A word of encouragement from his parents and teachers now and then is a great incentive to the youth of tender age.

Social Instincts. The youth has a strong desire for the companionship of those of his own age, and this desire lies at the foundation of the large number of boys' and girls' organizations. The best of these organizations when directed by a person who is in sympathy with their purpose are beneficial. See AUDUBON SOCIETY; BOY SCOUTS; CAMP FIRE GIRLS. Unless organizations of this sort are provided, boys especially are liable to form "gangs" whose influence over their members may be anything but beneficial.

During early adolescence boys' and girls' interests are separate, and they work better in separate organizations, but after sixteen they usually enjoy working together along lines in which their tastes are similar. In games and sports boys prefer those that are more strongly athletic than girls enjoy. Boys like to play ball, wrestle, swim, hunt and fish. Girls prefer indoor games and outdoor games not requiring severe exertion.

The Awakening. Youth is the time of high ideals, lofty aspirations, and boundless ambition. During this period most of the habits of life become fixed and vocations are chosen. It is a time of day-dreaming and castle-building, but, notwithstanding all the difficulties in the way, as surely as day follows day and one year succeeds another, just so surely will the time of awakening come to every boy and girl. It may come gradually, like the dawn; it may appear suddenly, like a burst of sunshine through a rift in the clouds, but come it will. It is the time of regeneration when all things take on a new significance. The view of life broadens; experiences deepen; some great ideal is selected, the following of which becomes a life purpose. The dauntless youth takes a far look into the future and sets forth upon life's journey with a zeal and energy that knows no defeat. W.F.R.

Consult G. Stanley Hall's *Youth: Its Educational Requirements and Hygiene;* Ellis's *Psychology of Sex.*

ADONIS, *a do' nis,* a genus of plants, so named because one species, the pheasant's eye, has bright scarlet petals which legend declares to have been stained by the blood of the beautiful youth Adonis (see below). Some of the species, which are native to Europe, have been naturalized in the United States and Southern Canada, where they are cultivated as garden plants. They belong to the same botanical family as the buttercup.

Adonis, in Greek mythology, was a beautiful youth loved by Venus. This goddess, refusing to be consoled after his death, begged Proserpina to let him return to the earth from the lower world. The goddess of the lower regions at length consented that the boy should live eight months of each year on earth. This was one of the myths of the seasons, Adonis' months on earth representing the spring, summer and early autumn, his months below the ground the gloomy winter. Another myth relating to the seasons is given in the article PROSERPINA. The myth of Adonis is of Phoenician origin.

ADOPTION, *a dop' shun,* in law, is the legal act of taking into the family a child, upon whom are conferred all the privileges belonging to a child born in wedlock. All of the American states and Canadian provinces have statutes governing the adoption of children, as have also most of the countries of Europe. An adoption is not legal in the sense of conferring upon the adopted person rights of inheritance unless these statutes have been strictly complied with.

ADRIAN, *a' dri an,* a name borne by six popes, the most noteworthy of whom were Adrian IV and Adrian VI.

Adrian IV, pope from 1154 to 1159, was an Englishman—the only man of that nationality who ever occupied the Papal chair. His name originally was NICHOLAS BRAKSPERE, and he was born about 1100. When but a boy he entered

a monastery in France as a servant, and remained in the same monastery until, in 1137, he became its abbot. In 1146 he was made cardinal-bishop of Albano, and eight years later was made Pope, despite the protests of the Italians. It was he who bestowed Ireland on the English king, Henry II, and who began that long struggle with the Hohenstaufen emperors which formed one of the most perplexing chapters of medieval history.

Adrian VI became Pope in 1522, and set himself at once to right abuses which had crept into the Church. His rule was unpopular, but even his enemies could not refuse him their respect, and he might have accomplished much had he not died before he had been two years in his high office.

ADRIAN, MICH., the county seat of Lenawee County, is noted principally for the manufacture of woven wire fences. It is situated on the Raisin River, in the southeastern part of the state. Toledo is thirty-three miles southeast, Detroit is sixty miles northeast, and Chicago is 210 miles west. Railway transportation is provided by the Detroit, Toledo & Ironton, New York Central and Wabash railroads and the Toledo & Western electric line. Adrian was founded in 1825, was incorporated as a village in 1828 and as a city in 1850. It was named in honor of the Roman Emperor Hadrian. In 1914 the commission form of government was adopted. The population increased from 10,763 in 1910 to 11,878 in 1920, Germans and Irish forming the greater part of the small foreign element. The area exceeds four square miles.

Adrian is the pioneer city in the United States in the woven-wire fence industry. Six mills are engaged in making this product; the largest employs 1,200 men and has its wire mills at Monessen, Pa. In addition to these it has manufactories of automobiles, pianos, organs, furniture and electrical supplies. It is also a shipping point for grain, fruit and dairy products. The city has a Federal building, a Y. M. C. A. building and a city hall. Besides its public schools and a public library with 20,000 volumes, there are Adrian College (Methodist Protestant), Saint Joseph's Academy and the State Industrial Home for Girls, for the correction of female offenders between the ages of ten and seventeen. To its beautifully shaded streets the city owes the name *The Maple City,* by which it is locally known.

ADRIANO'PLE, a fortified city and important military post in the northeastern part of former European Turkey, now a part of Greece, confirmed by treaty in 1920. It is 137 miles by rail west and north of Constantinople. Adrianople was founded on the ruins of an ancient Thracian city by the emperor Hadrian (A. D. 76-138), and was the capital of the Ottoman Empire from 1361 to 1453. In 1829 a treaty was signed here by Russia and Turkey in which the former agreed to acknowledge the independence of Greece. During the Balkan War the city was besieged by the Bulgarians and Serbians for six months and surrendered on March 27, 1913, but on July 21 of the same year it was recaptured. The chief buildings are a great mosque, a palace now in ruins, inns, churches, schools, and two splendid bazaars. The manufactures are silk, woolen and cotton stuffs, attar of roses and leathers. Population, 1920, 50,201.

ADRIAT'IC SEA, an arm of the Mediterranean, stretching in a northwesterly direction from the Straits of Otranto, along the eastern coast of Italy. Its length is about 480 miles, its average breadth about 100 miles, and its

'Tis sweet to hear,
At midnight on the blue and moonlit deep,
The song and oar of Adria's gondolier,
By distance mellowed, o'er the waters sweep.
—BYRON.

area about 60,000 square miles. In the north it forms the Gulf of Venice, on which is Venice, the city on the sea. In the northeast is the Gulf of Triest. Formerly the Adriatic was the highway of an extensive commerce of the medieval cities and those of the early modern period. To-day it is of little importance commercially, and since the War of the Nations began in 1914 has been largely under the political control of Italy.

ADULTERATION OF FOODSTUFFS AND CLOTHING. Foods serve two main functions in the human body. In the first place, the body structure, such as bone, muscle, skin, blood, etc., must be built up from the food which is consumed. The food must therefore not only contain all the elements found in the body, but these elements must be present in the food in sufficient quantity to supply the needs of the body.

Among the peoples subsisting largely on rice a disease known as *beri beri* has been shown to be due to the consumption of polished rather than unpolished rice. When the thin outer coating of rice is removed, a considerable percentage of the nitrogen and especially of the phosphorus present in the grain is removed. The absence of a sufficient quantity of these elements in the diet produces the disease. When unpolished rice or other food, such as fish, containing these elements in abundance, is consumed, health returns.

There is a great deal of evidence to show that the poor teeth of many people is due to the consumption of refined foods from which the coarser portions containing the mineral constituents necessary for the growth of the teeth have been removed. Aenemic conditions are due to the lack of iron compounds which are present in large quantities in green vegetables.

These elements must also be combined with each other in the food, forming certain definite chemical compounds in order to be available as food for the human system.

Foods. *Energy Furnished by Food.* In the second place, the food must furnish the energy which is required by the body to carry on its varied activities. This includes not only the external activities, such as walking or physical labor, but also the internal activities, such as breathing, the circulation of the blood, digestion, etc. For the average man the internal activities consume about twice as much energy as the external activities. Energy must also be constantly supplied to compensate for that given out as heat, because it is necessary to maintain the body temperature at the normal point of 98½°.

During muscular activity of any kind about two-thirds of the total amount of energy expended is given out as heat and only about one-third as mechanical energy. For this reason a physically-active person becomes too warm and the excess of heat must be removed, which is accomplished by the evaporation of perspiration from the skin. The heat must force the blood to the surface of the body in order to cool it. The energy for all of these activities must be furnished by the food. For adults this is the most important function of food. The nutritive value of food depends therefore upon the amount of energy which it contains as well as upon the presence of constituents which serve to build up the tissues of the body. If the nutritive value of food has been reduced in any way the food has been adulterated. Many staple foods are at times adulterated in this manner.

Condimental Foods. The flavor and appearance of foods are also important because these qualities add to the digestibility of foods. Indeed, many foods are used only for the agreeable odor or taste which they impart to other foods. This is especially true of spices. The flavor of foods is very largely influenced by the climate in which they are grown, as well as the method of cultivation and preparation for the market. For this reason it is illegal to sell a food represented as having been produced in a given country or locality when it has been grown or produced elsewhere. Flavoring or coloring an article of food so as to make it appear better is also illegal and fraudulent, unless this fact is stated on the label, that all may read the truth.

Preservatives. The addition of a poisonous ingredient to foods, no matter in how small quantity, is also illegal and is classed as adulteration. It is seldom that highly poisonous substances are added to foods except in minute quantities, but many substances which injure the health have been added in small quantities as preservatives or coloring matter. The addition of preservatives is objectionable, even though the preservative itself is harmless, because in many cases the preserved food is inferior to fresh food in flavor, digestibility, nutritive value or wholesomeness. While most preservatives have been found to be poisonous substances, benzoate of soda has been found to have no bad effect when taken with foods in the amounts necessary for their preservation; but under commercial conditions foods prepared with this or other preservatives are inferior to foods to which preservatives have not been added.

Artificial Coloring of Foods. Coloring matter, aniline dyes or vegetable coloring matter are frequently added to foods. This is done for two distinct purposes—to improve the appearance of natural foods or to enable an

artificial product to be sold as a natural product. For instance, pure butter is frequently colored because most people prefer yellow to white butter; on the other hand, artificial butter, such as oleomargarine, is often colored so that it may be sold as butter. The latter use of coloring matter is fraudulent, while the former is considered legitimate if the coloring matter is harmless. (See subheading *Butter and Its Substitutes,* below.)

A considerable number of vegetable dyes are known which are entirely harmless. As the result of a careful investigation made by the United States Department of Agriculture, it was found that there are seven aniline dyes which are entirely harmless when pure. Any desired color may be produced by some one of these dyes or a combination of two or more of them. However, unless these dyes are manufactured with great care, poisonous substances, such as other dyes or arsenic, will be present. For this reason when these dyes are to be used in foods they are tested by the government and a certificate is given that the lot tested is pure. Such tested dyes are known as certified dyes, and may be used in foods where there is no intention to deceive.

It is also illegal to sell the flesh of diseased animals, decayed or decomposed fruits or vegetables. To guard against such sales, foods are inspected by national or local health officers.

Milk. Milk owes its value as a food to the presence of butter fat, casein, milk sugar and mineral matter. It is adulterated when the fat has been removed as cream or when it has been diluted by the addition of water. Most civilized countries have passed laws specifying the percentage of fat and water which must be present in milk which may be sold. Usually not less than three or three and one-half per cent of fat is required, and not more than eighty-seven or eighty-seven and one-half per cent of water may be present in milk. Generally thin milk is produced by skimming or watering, but occasionally cows are found which naturally produce milk with less fat than required by law. The sale of such milk is illegal. The addition of a chemical preservative such as formaldehyde or borax is also illegal. The greatest danger from the consumption of milk arises from the presence of disease germs such as the tuberculosis, typhoid or diphtheria germs. Milk produced with the best known precautions against the entrance of these germs is known as certified milk.

Butter and Its Substitutes. Pure butter must not contain an excessive amount of water due to the addition of a large amount of salt. It may be colored with a harmless dye. An inferior grade of butter known as *renovated* or *process butter* is prepared from rancid or inferior butter. Renovated butter is wholesome, but it is inferior to good creamery butter and should be sold as such.

Oleomargarine is an artificial substitute for butter which is manufactured from various animal and vegetable fats, to which some milk has been added. There is therefore always present in oleomargarine some true butter fat. While wholesome and nutritious, oleomargarine is inferior in flavor and probably in digestibility to butter, and it is therefore illegal to sell it as such. If it is colored yellow it is difficult to distinguish it by appearance, taste or odor from butter. See OLEOMARGARINE.

A number of other substitutes for butter have been developed; most of these are compounded from vegetable oils. This has been rendered possible by the development of a process known as *hydrogenation of oils,* by which oils are converted into solid fats. The vegetable oils are quite as wholesome and nutritious as the animal fats and are considerably cheaper, but are not suitable for culinary use because they are not solid. The hydrogenated oils are excellent substitutes for lard and butter for cooking purposes. These fats are excellent foods, and their sale is entirely legitimate if sold for what they are.

Oils. Olive oil is the choicest of the vegetable oils and has been used as food for centuries. Many other vegetable oils are quite as nutritious and wholesome, but are not equal to olive oil in flavor. Olive oil is the most expensive of these vegetable oils, and for this reason other oils are at times mixed with it or substituted for it. In the United States cotton seed oil (which see) is the most largely-produced vegetable oil. The most common adulterant of the olive oil sold in the United States and Canada is cotton seed oil. See OLIVE OIL.

Meats. Meats and meat products are at times subjected to adulteration by the addition of preservatives, borax and sulphite of soda being commonly used for this purpose. Sulphite of soda gives a bright red color to meat which is decomposed and unfit for consumption. If the preservative were not added the odor and appearance of the meat would give evidence of its condition.

Fruit Preserves. Jellies, jams and preserved fruits have been subjected to a great deal of adulteration. Glucose or corn syrup has been used instead of sugar. This reduces the sweetness of the food, but does not affect its nutritive value or wholesomeness and prevents crystallization of the sugar. The fruit or fruit juice being the most expensive ingredient, it is replaced by artificial flavoring and coloring matter. In some cases the fruit pulp from which the juice has been extracted is used for the manufacture of jams, artificial flavoring and coloring matter being added. Preservatives are added to avoid the prolonged and expensive heating necessary for sterilization.

Flavoring Extracts and Spices. Imitation flavoring extracts are very largely sold. This is especially true of vanilla, as the vanilla bean is very expensive. Ground spices have been adulterated by the admixture of a great variety of ground material, such as nut shells, sawdust, etc. In some cases, such as cloves and ginger root, the exhausted spice is sold from which the flavoring matter has been extracted.

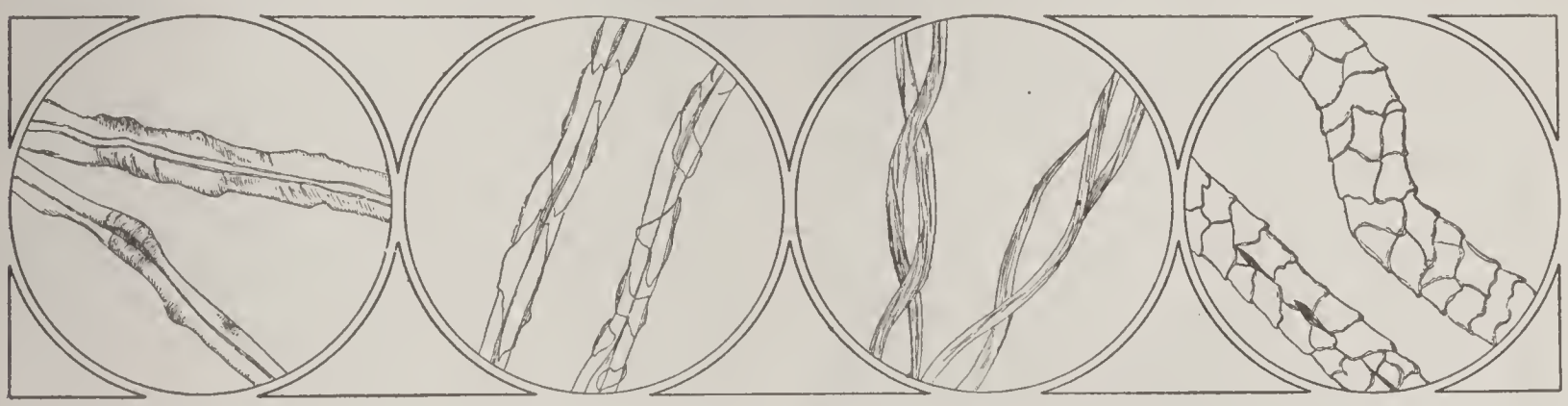
Candies. A great variety of ingredients may be legitimately used in candies. Glucose is a perfectly wholesome and nutritious substitute for sugar. At times poisonous coloring matter has been used, but in recent years only the pure certified dyes have been commonly employed. The excessive consumption of candy is probably more injurious than any ingredient present in it.

Clothing. *Cotton and Linen.* The fibres used in the manufacture of clothing are cotton, linen, silk and wool. The cheapest of these is cotton, and for this reason cotton is used as the adulterant of the other fibres. Cotton and linen are vegetable fibres, and are very similar to each other. The cotton fibre is obtained from the seed pods of the cotton plant, while the linen fibre is obtained from the stems of the flax plant. The latter is cultivated both for the fibre and the seed, which is known as linseed. The linen fibre is longer, has a somewhat more silky appearance than the cotton fibre and is therefore considered more valuable, although in some European countries where linen is the cheaper, the substitution of linen for cotton is considered adulteration. See Cotton; Flax.

Wool. Wool is produced from a great many species of sheep and goats, and its fibre differs very largely in length and texture, depending upon the locality and the animal from which it is produced. Cloth may be "all wool" and yet be of very inferior grade as compared with cloth made from a better quality of wool; so one piece of cloth may be worth several times as much as another, both of which are "all wool."

The amount of wool produced is sufficient to supply only about one-tenth of the demand for clothing. For this reason the wool in cast-off garments is used over again. Processes have been developed by which the wool in an old garment is separated from the cotton or other fibres present, cleaned, carded and again spun into yarn. This second-hand woolen fibre is called *shoddy*. It is but little inferior to the particular grade of wool which it originally constituted. Shoddy produced from cloth made of a high grade of wool of long fibre is far superior to a low grade wool of short fibre. The excellence of woolen cloth does not depend so much on whether shoddy or new wool has been used in its manufacture as upon the length and texture of the fibres of the wool or shoddy employed. See Wool.

Silk. Silk is the fibre of which the silkworm forms his cocoon. This worm spins a continuous thread composed of two strands which is wound into a cocoon by the movements of the worm. The fibre is solid and therefore has a gloss which is far superior to that of the vegetable fibres or wool, which are hollow and flat. By a chemical process the cotton fibres may be so changed as to give a gloss somewhat



TYPICAL FIBRES, MUCH ENLARGED

Linen Silk Cotton Wool

similar to that of silk. This is known as *mercerized cotton.* Artificial fibres have also been produced by chemical means which have a gloss equal or even superior to silk in wearing qualities. This quality of material is being very largely manufactured and will no doubt largely replace the use of natural silk, but it should not be sold as natural silk.

Aside from this substitution of artificial for natural silk, the latter is subjected to a process of *loading* which if carried to excess is objectionable. Natural silk in its raw state is covered with a gummy substance which gives it a harsh feeling and a yellow, unsightly appearance. When this material is removed by washing the skeins of silk, about four ounces is lost per pound of silk. The fibre is then brought back to its original weight by the deposition of tin phosphate. The tin used for this purpose is obtained by detinning tin cans and other waste tin scrap. Silk fibre may be so "loaded" with this tin that the original pound of fibre may become almost double that weight. Such silk feels heavy but does not wear well. This excessive loading must be considered adulteration. See SILK. J.C.O.

Consult Olson's *Foods and Their Adulteration;* Wiley, Richardson, Crampton & Spencer's *Foods;* and *Food Adulterants* by the same authors. The Department of Agriculture also issues circulars.

AD'VENTISTS, several religious sects which, accepting the general doctrines of Christianity, expect that Christ will soon reappear in person and bring the world to an end. Belief in such a second coming existed before the nineteenth century, for there was a general expectation throughout Europe that the world would be brought to an end in the year 1000, and preachers have arisen at intervals ever since, declaring that the coming of Christ was at hand. However, the sects known as Adventists all arose from the preaching of William Miller, who began in 1831 to prophesy the end of the world and the establishment of Christ's kingdom in 1843. He based his belief on the Biblical prophecies, having calculated that all the signs and wonders which the book of Daniel and other books prophesied had come to pass. Since the middle of the nineteenth century Adventists have simply waited for the early appearance of Christ and have not tried to fix the date.

The Adventists are now separated into a number of different sects, of which the *Church of God,* the *Evangelical Adventists,* the *Age-to-Come Adventists* and the *Life and Advent Union* are small and local. The *Advent Christians,* who number about 26,800, have over 600 churches and sustain foreign missions in England and in Asiatic countries. *The World's Crisis* is their leading publication. The largest sect of Adventists dates from a meeting held at Washington, New Hampshire, in 1845. See SEVENTH-DAY ADVENTISTS.

ADVERB. The part of speech known as the *adverb* performs for the verb the same office that the adjective performs for the noun; it limits and modifies its meaning. The verb *walk,* for example, calls up only a general image of the action; but add to it the word *painfully,* and immediately the mental picture assumes definiteness. The word *adverb* comes from the Latin and signifies *joined to a verb,* but an adverb may also be used to modify an adjective or another adverb.

Classes of Adverbs. Adverbs are classified (1) as to their use in the sentence, and (2) as to their inherent meaning, without regard to the special work they perform. From the standpoint of *use* there are three classes:

1. *Simple adverbs,* used merely to modify; as, He left *abruptly;* She spoke *lovingly.* These are derived chiefly from adjectives and participles by the addition of the suffix *ly.*

2. *Conjunctive or relative adverbs,* which not only modify but also connect the adverbial clause with the body of the sentence; as, I do not know *when* he left. The principal conjunctive adverbs are the following:

when	after	out
where	whence	why
as	before	wherever
while	till	whereby
there	until	wherefore

3. *Interrogative adverbs,* which introduce a question; as, *When* did he leave? The most important of these are:

when	where	why	how

From the standpoint of *meaning,* there are six principal classes of adverbs, and two of lesser importance:

1. *Adverbs of time,* answering the question *when;* as—

now	before	by and by
yesterday	afterward	ever and anon
instantly	often	again
now and then	to-day	to-morrow
then	heretofore	still

The last three phrases, and others of similar construction, are sometimes termed *phrase adverbs.*

2. *Adverbs of place,* answering the questions *where,* to what place, from what place; as—

where	out	yonder
here	down	whither
there	up	hither
anywhere	away	everywhere
back	whence	within
backward	without	elsewhere

3. *Adverbs of degree,* answering the question *to what* extent; as—

very	little	sufficiently
quite	much	last
too	more	least
exceedingly	most	scarcely
almost	no	hardly

The word *the* is also an adverb of degree in constructions like "*The* earlier *the* better," where it precedes the comparative form of the adjective.

4. *Adverbs of manner,* answering the question *how* or in what way; as—

how	ill	fast
so	badly	helpfully
thus	aloud	one by one
well	quick	little by little

5. *Adverbs of cause,* answering the question *why;* as—

why	therefore	hence
thus	wherefore	whence

6. *Adverbs of number,* answering the question *how many;* as—

once	twice	secondly
thrice	first	thirdly

7. *Adverbs of assertion,* including the *affirmative* adverbs *yes, yea* and *aye,* and the *negative* adverbs *no, nay, not, never.* When *yes* or *no* stands alone it is equivalent to a full sentence and is called a *sentence adverb.*

8. *Modal adverbs,* which modify not a single word but an entire clause, as in the sentence, "Perhaps he cannot find the way." The following are the principal adverbs so used:

certainly	probably	nevertheless
surely	possibly	consequently

Comparison of Adverbs. Only the adverbs of degree and manner, with a few adverbs of time, like *soon, often* and *early,* are subject to comparison. Like adjectives, these are compared by three different methods:

Comparison by Adverbs. The most frequent method of comparing adverbs is to prefix *more* or *less* for the comparative and *most* or *least* for the superlative; as—

POSITIVE	COMPARATIVE	SUPERLATIVE
cheerfully	more cheerfully	most cheerfully
clearly	less clearly	least clearly

Comparison by Endings. A small number of adverbs which have the same form as the corresponding adjectives are compared by adding the suffix *er* or *est;* as—

POSITIVE	COMPARATIVE	SUPERLATIVE
deep	deeper	deepest
early	earlier	earliest
fast	faster	fastest
hard	harder	hardest
high	higher	highest
long	longer	longest
loud	louder	loudest
often	oftener	oftenest
quick	quicker	quickest
soon	sooner	soonest

Thus, it is correct to say, "He dug *deeper,*" instead of "He dug *more deeply;*" "He sang *loudest,*" instead of "He sang *most loudly.*"

Irregular Comparison. Just as there are some adjectives that are compared irregularly, so there is a similar list of adverbs; as—

POSITIVE	COMPARATIVE	SUPERLATIVE
badly	worse	worst
far	farther	farthest
forth	further	furthest
ill	worse	worst
late	later	last (latest)
little	less	least
much	more	most
nigh (near)	nearer	next
well	better	best

Incapable of Comparison. It is evident that there can be no comparison in the case of such adverbs as *here, then, thus, once, yesterday,* and others of similarly absolute meaning. See COMPARISON.

Parsing the Adverb. In parsing an adverb the three essentials are (1) its classification—whether an adverb of time, place, manner, or belonging to one of the other groups; (2) its degree of comparison, if it can be compared; (3) its syntax, defining its function in the sentence.

Type Sentence: *We were now slowly approaching a far more pretentious city.*

Now is an adverb of time, modifying the predicate, *were approaching;* it cannot be compared. *Slowly* is an adverb of manner; positive degree (*slowly, more slowly, most slowly*); used to modify the predicate, *were approaching.* Far is an adverb of degree; positive degree, irregularly compared (*far, farther, farthest*); used to modify the adverb *more. More* is an adverb of degree; comparative degree, irregularly compared (*much, more, most*); used to modify the adjective *pretentious.*

Position of the Adverb. The general rule is to keep the adverb as close as possible to the word it modifies. If we say, "Look at the flower you are holding *closely,*" we convey an idea probably not intended. The adverb should be placed next to its verb, making the sentence read: "Look closely at the flower you are holding." This is particularly important in the case of such words as *only, almost, already, ever, never,* and the like.

Usually the adverb follows the verb; as, "He spoke *cheerfully.*" Certain adverbs of time, however, like *often, frequently, seldom* and others, are generally placed before the verb; as, "We *seldom* speak of the matter and *never* refer to it in her presence." The adverb precedes a transitive verb in order to avoid separating it from its object, unless the sentence is very short; as, "He *rapidly* reviewed the facts that had been brought out."

Where adverbs of different classes are employed in the same sentence they should be used in the following order: time, place, man-

ner; as, "The boat *generally* gets us *here* very *quickly*," not, "The boat gets us *here generally* very *quickly*." The principal adverb is the one that denotes time.

Common Errors. Most of the errors in the use of adverbs arise from incorrect placing and from the use of adjectives for adverbs or adverbs in place of adjectives. The following paragraphs embody some of the more frequent mistakes; reference should also be made to the errors listed under ADJECTIVE:

The class only read one page, for *The class read only one page.* The first construction gives the idea that the page was only *read*—not copied or recited upon; whereas the thought intended is that the class stopped with the reading of that single page.

I don't ever remember to have met him before, for *I don't remember ever to have met him before.* The *ever* belongs to the verb *to have met,* not to *remember.*

He promised to faithfully stick to his work, for *He promised to stick faithfully to his work.* Unless there is a definite advantage to be gained from "splitting the infinitive," there is no object in violating the ancient rule that the verb must not be separated from its sign, *to.*

Is he here already? for *Is he already here?* The adverb of time should precede that of place. This impropriety is especially common in the speech of Germans just learning the English language.

He felt badly because he had played so poor, for *He felt bad because he had played so poorly.* The verbs of the senses—feel, see, hear, smell, and the others—are followed by adjectives, not by adverbs, because they describe conditions rather than actions. See other examples under ADJECTIVE.

You look good, for *You look well. Good* and *well* are both adjectives, but the latter expresses a condition of health, whereas *good* refers to moral character. *He looks good* is equivalent to saying that he looks like a good man. *He looks well* implies that he is in good health.

They were very excited, for *They were very much excited; He is a very educated person,* for *He is a very well educated person.* It is a rule of grammar that the adverb *very* must never be used directly to modify the perfect participle; there must be an intervening adverb such as *much, well* or *greatly.* It can, however, modify the present participle; as, *It was very exciting.*

He returned back, He advanced forward, He fell down, for *He returned, He advanced, He fell.* The adverbs are superfluous because the idea in each case is fully expressed in the verb.

The orator spoke contemptibly of the policies of the administration, for *The orator spoke contemptuously of the policies of the administration.* The policies may have been contemptible, but the orator treated them with scorn, hence contemptuously.

He pointed out, firstly, that the measure was uncalled for, and, secondly, that it was actually harmful, for *He pointed out, first, that the measure,* etc. Note that *first* is included in the list of adverbs of number and therefore has no need of the suffix *-ly.*

He didn't have hardly enough to eat, for *He didn't have enough to eat,* or *He had hardly enough to eat.* The adverb *hardly* has the force of a negative, and a double negative is equivalent to an affirmative.

This here book has more pictures than that there one, for *This book has more pictures than that one.* The adverbs *here* and *there* are superfluous, since the pointing out is done by the adjective pronouns *this* and *that.*

They go more oftener than I do, for *They go oftener than I do. More oftener* is a double comparative and therefore as much to be avoided as a double negative.

I distrust him worse than before, for *I distrust him more than before. Worse,* the comparative of *badly* or *ill,* should not be used for *more.*

L.M.B.

Outline on the Adverb

I. Definition
   (a) Used with verb, adjective or adverb
   (b) Limits or modifies
II. Classes
   (a) As to use
   (b) As to meaning
III. Comparison of adverbs
   (a) By prefixed adverbs
   (b) By endings
   (c) Irregular comparison
   (d) Incapable of comparison
IV. Parsing the adverb
   (a) The three essential points
   (b) Type sentence
V. Position of the adverb
   (a) Following the verb
      1. Exceptions
   (b) Compound tenses and voice
   (c) Precedence in a series
VI. Common errors

ADVERTISING, a method for inviting or urging the sale or exchange of property or service. While any effort to effect a sale or exchange is properly called advertising, the word is commonly used with a somewhat limited meaning. The offer of merchandise for sale, such as the advertising of goods by a manufacturer or merchant, is the most familiar form. The channels for this variety of publicity are newspapers, magazines, billboards, electric signs, cards in street cars, moving pictures and programs.

By the advertisement of service is not meant exclusively the offer of personal service—the familiar "help wanted" or "situation wanted"—but includes the advertising of railroads, ships, political candidates, church services, etc.

So great has been the investment in advertising that it affords to newspapers and nearly all magazines their chief source of income. This operates to supply the public with the highest form of news service and current literature at extremely low prices. Were it not for

advertising revenue to the magazines a publication now selling at ten cents or fifteen cents per copy could not be bought for less than twenty-five cents, and in many cases fifty cents. Some magazines now reach the reader for a less sum than the cost of the blank paper used in their manufacture. A great metropolitan Sunday newspaper sells for five cents, and nearly always the paper on which each copy is printed costs more than that sum.

The growth of advertising as measured by expenditure has been rapid in recent years. It has made the most notable advance in the United States, which leads all other countries of the world, with an annual expenditure estimated at $700,000,000. In Canada it is believed about $50,000,000 is thus invested yearly, a sum somewhat lower than in the United States in proportion to population.

Some Heavy Expenditures. In certain lines of business advertising is more heavily employed than in others. Manufacturers of food articles and household conveniences contribute largely to the total. One particular article of prepared food has been advertised for several years to the extent of $750,000 annually, and a cleaning compound has been advertised to a like extent. A chewing gum, where each sale is only five cents, has received publicity which costs $500,000 annually; a certain brand of cigarettes has had a like advertising appropriation; a five-cent cigar has been advertised to the extent of $250,000 a year. A set of books, a correspondence course of study, a brand of hosiery, a watch, one make of table cutlery, a talking machine, various brands of soap, each has been advertised in excess of $100,000 annually. The advertising of patent medicines and curative devices once provided very large incomes to papers and magazines, but this has in recent years been excluded by all the better magazines and many newspapers; this is also true of alcoholic beverages, and to a lesser extent, of cigarettes.

The automobile industry has set a new mark in advertising volume. A single manufacturer of an automobile is said to have spent in 1916 for this purpose not less than $2,000,000. It is a noteworthy fact that as the amount of money invested in advertising this particular make of automobile was increased each year, the selling price of the machine decreased, while its attractiveness and service value was said to have been improved. Although the total amount of money employed in advertising by the entire automobile industry has increased each year, the average price of cars has decreased. The effect of advertising commodities in other notable instances has been to improve the quality of the goods and reduce the price to the consumer. This seeming inconsistency is explained by the fact that advertising aids selling so effectively that it performs economies in the commercial transaction.

The above particular cases must not incline the reader to believe that all advertising appropriations are invested profitably. Many millions of dollars yearly are vainly spent—the response to the public appeal is slight. Sometimes the thing advertised, if not one of the necessities of life, does not catch the fancy of the public; if a necessity, some other equally necessary commodity is presented more attractively or more vigorously and eclipses its rival. The choice of advertising mediums weighs heavily for or against success, also. To cite an extreme case, it would invite failure to advertise tobacco products in a woman's magazine, although for obvious reasons a good advertisement of smoking jackets in such a publication prior to Christmas has proved a good investment.

The firm that places its announcements before the public and then believes its work is done invites failure. If it seeks direct sales to purchasers it must have printed matter describing its wares and a system of "follow-up" letters, variously phrased and convincing, to complete the work the public announcement started. All this subsidiary material is a very real part of advertising.

Advertising Agencies. Advertising as a business with a professional skill in it dates back to the latter half of the nineteenth century, when facilities were at hand for the spread of knowledge and the rapid distribution of goods over a wide area. The advertiser then began to take into account the greater need for expert knowledge. This developed the expert who could prepare advertisements with skill and who could supply information as to the character and circulation of publications in different localities. In handling the space he was a broker, making the best terms he could with the publisher on one hand and the advertiser on the other. Later on, publishers and owners of various kinds of advertising space fixed prices for their space and made a special rate to the advertising experts. These experts became known as *advertising agents,* and their business grew into institutions of large financial responsibility with complete equipment for

handling all the manifold requirements and growing details of advertising. Such organizations are now called general advertising agencies, because they deal in the space of all the recognized channels of advertising dissemination.

Advertising agencies which represent particular publications or other forms of advertising space are called *special agencies.* Thus the advertising representative of a newspaper, magazine or any outdoor form of advertising is called a special advertising agent. The general advertising agent, instead of trying to promote the use of a particular publication, advises the advertiser as to the purchase of space in a variety of mediums with a view to the best results from the advertising.

Advertisers Classified. In the profession advertisers are classified as *local* and *general.* In the latter class are those who advertise in more than one city. General advertisers who sell and deliver goods direct to the consumer are called *mail-order houses.* Their style and method of advertising is called mail-order advertising. The largest individual merchandising concern on the American continent and probably in the world is that of a mail-order firm in Chicago.

Mail-Order Houses and Advertising. A large percentage of general advertising appearing in magazines is done by mail-order houses. Some magazines are known as mail-order magazines. Their circulation is in smaller towns and on the farms. Mail-order advertising is not confined to these publications, however, but runs in all magazines. Newspapers in the smaller cities and towns as a rule refuse to publish mail-order advertising because it is in competition with local merchants.

Mail-order advertising is of two kinds; it seeks (a) to induce the reader to buy upon reading the advertisement, and (b) to induce the reader to write for more information. The two kinds are sometimes combined in the same advertisement, with a view to obtaining direct sales from some readers and inquiries from others.

The answer to the inquiry is called a "follow-up." It usually consists of a catalogue, if the advertiser has many articles to sell, and a letter and an order blank. If the advertiser has few articles to sell, a booklet or circular takes the place of the catalogue.

Inquiries to a mail-order firm have a determined value, depending upon the character of the business. When one has inquired by mail and makes a purchase, he is listed as a customer. The names on the list of customers take on a higher value. The value of such a list often exceeds a million dollars. One mail-order firm puts a value of $30,000,000 on its good will and lists of names.

General Advertising. The general advertising of goods to be sold to consumers through dealers is called *publicity advertising.* Advertising in newspapers is classified as *local* or *foreign.* By foreign is meant advertising of a firm using newspapers in several or many cities, or that of a firm whose place of business is in another city.

Direct advertising is the sending of the advertisement by mail to a list of persons, or by messenger to homes or places of business in a certain area. The advertisement in this case is called a mailing piece. The giving of samples of goods, usually grocery articles, is a method employed to introduce new brands. It is sometimes done extensively with crews of men going from house to house.

Outdoor advertising includes painted bulletins, painted walls, billboards, electric signs, also metal signs, cloth banners, and cardboard signs to be tacked up, and several lesser forms.

Outdoor Advertising. Painting and billposting have become large industries, combining plants in the different cities for handling these forms of advertising. Electric signs are usually handled by the painted sign industry. The volume of advertising in paint, posting and electric signs in 1916 was about $10,000,000.

Some of the outdoor signs in favored locations in the large cities are sold to the advertiser for as much as $700 per month for a single painted sign and $2,500 per month for a single electric sign. Cards in street cars form another branch of considerable advertising.

Cost of Advertising. The price of advertising is based on the quantity of circulation of the newspaper or magazine in which it appears, for its value depends upon the number of persons to whose notice it is brought. In large newspapers and all magazines the basis of calculation is what is called an *agate line,* one column in length. The word *agate* is the name of a type so small that fourteen lines of it in depth occupy one inch of column space. In large newspapers the rate is about one-tenth of a cent per agate line for each thousand of circulation; a circulation of 100,000 copies would therefore justify a rate of ten cents per line, or $1.40 per inch, each insertion. In papers of smaller circulation the rate per line

OUTLINE AND QUESTIONS ON ADVERTISING

Outline

I. What It Is

(1) Offer of merchandise
(2) Offer of service

II. Its Mediums

(1) Newspapers
(2) Magazines
(3) Billboards
(4) Electric signs
(5) Street-car cards
(6) Moving pictures
(7) Programs

III. Present-Day Extent

(1) Expenditure in United States
(2) Expenditure in Canada
(3) Vast sums spent on specific articles

IV. Results

(1) Increased output at decreased cost made possible by resulting popularity of goods
(2) Sale of newspapers and magazines at a sum which would not cover cost of blank paper

V. Necessary Conditions

(1) Display qualities
(2) Wise choice of medium
(3) Persistent "follow-up" system

VI. Classification

(1) General advertising
  (a) Mail-order houses
(2) Local advertising
  (a) The country merchant's problem
    (1) Constant advertising
    (2) Particular appeal
    (3) Attractive window displays

VII. Cost of Advertising

(1) In newspapers and magazines estimated by line
(2) Cost of outdoor signs in good locations
(3) Electric signs

VIII. Advertising Agencies

(1) General
(2) Special

IX. Future Possibilities

(1) In economic affairs
(2) In politics
(3) In social welfare work

Questions

What is a "follow-up" system?

Why is it possible to secure a magazine with excellent stories and helpful articles for five, ten or fifteen cents?

Why does not all money spent in advertising bring in good returns?

Why have so many small-town merchants been driven out of business by mail-order houses?

How can this problem be met?

How does the advertiser who is not clever at preparing his own "copy" go about it to secure effective advertisements?

What part has advertising played in politics?

Toward what two ends is mail-order advertising directed?

Why can a manufacturer who is spending hundreds of thousands and even millions of dollars annually in advertising afford to sell his commodities cheaper year by year?

What is the difference between general and local advertising?

What two interpretations may be put upon the expression "advertisement of service"?

In what country is the annual expense for advertising heaviest?

What industry expends most in advertising?

About what would it cost to run a two-inch advertisement for one month in a magazine with a circulation of 1,000,000?

per thousand is higher. Magazines of large general circulation charge from one-third to two-thirds of a cent per line per thousand. Publications of class circulation charge a higher rate. There are several magazines with a general circulation of 2,000,000 copies each in which the rate is four-tenths of a cent per line per thousand, $8 a line, or $112 an inch. A double page advertisement in one of these magazines costs as much as $12,000 for a single insertion. Advertisements larger than two pages are rare.

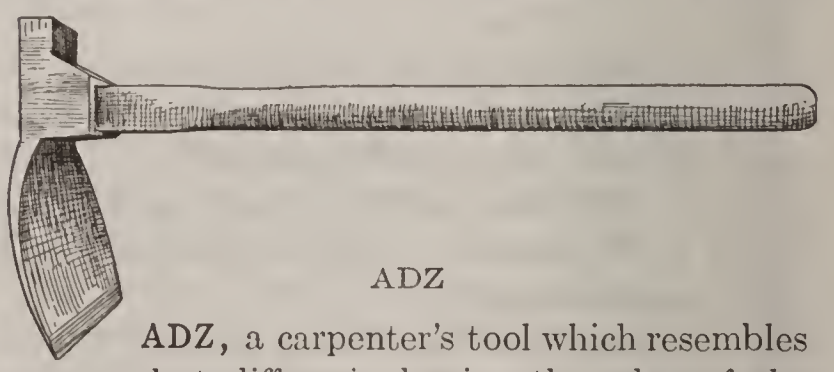
The Future of Advertising. This is a matter which is the subject of much speculation. It is generally believed that its usefulness will continue to increase, and that new employment of it will be found.

It has largely taken the place of other promotive methods of political parties, and has obviated much of the rancor that marked political campaigns. It has been used by governments to popularize war, to promote the sale of securities and to induce tourist-travel. It has not been used by governments to promote the peaceful relations of nations, as such use of advertising would be destructive of the influence of secret diplomacy. The exercise of the power of advertising makes for democracy by the spread of knowledge and the creation of understanding. Its educative force develops the desire for its greater use. Its future holds promise of developing the dominant world power for economic and social betterment and for permanent peace.

The Country Merchant's Problem. Experience has proved the stern necessity of advertising in any line of business, if that business is to attain even a fair degree of success. In the small community the merchant errs who says, "I do not need to advertise, everybody knows me." It is true that the man who was Vice-President of the United States in the Taft administration—to go no farther back—was well-advertised and well-known at the time, but to-day few remember his name. The merchant should remember that great Chicago mail-order firms (the largest in the world) are as well known, by name, as he is, and they persistently keep the merits of their wares before his neighbors.

It is not enough for the country merchant, in his space in the local paper, simply to tell the people he deals in groceries or dry goods. He must learn from city advertisers that the only profitable investment in advertising is to make a particular appeal in every announcement. When he gives his neighbors something to their interests to think about in connection with local merchandising they will give him increased support and will feel less dependent on mail-order houses.

Higher rent in a building which many people pass may well be considered a good advertising appropriation, but, having secured such a location, sometimes fullest advantage is not taken of it. Window dressing is a potent advertising factor, and it is an art worthy of cultivation. What is placed in the window will attract customers or emphasize the unprogressive character of the merchant. The window display should be attractive and distinctive; it should make a seasonable appeal. A variety of things in a miscellaneous display leaves little impression on the beholder; a colony of silkworms and a display of silks is not only educational and inviting as a spectacle but is sure to turn thoughts towards silken raiment. Specimens of unpicked cotton will create comment and stimulate interest, and they are not difficult to obtain. A pair of new shoes for baby at one end of the window, a pair of old, worn-out boots at the farthest corner, between the two a groundwork of earth and a path leading from one to the other—"Between these lie life's pathway"—will long be remembered, and advertising does its work when the boot-and-shoe merchant announces that he cares painstakingly for needs of all ages. J.O'S.



ADZ

ADZ, a carpenter's tool which resembles an axe, but differs in having the edge of the blade at right angles to the handle. The chisel-shaped blade, which is from four to five inches long, is curved, and the head has a socket into which the long straight handle is fitted. The ordinary adz is used for smoothing timber, but some are curved and are designed for shaping eave-troughs and hollow ware.

AEGEAN, *e je' an,* **SEA,** a body of water which, because of its almost innumerable islands, is also called the Aegean Archipelago. It is that part of the Mediterranean which lies between Greece and Asia Minor, and is in length about 400 miles and in greatest breadth 175 miles. Of its islands, many of which are of volcanic origin, the most important are

Delos, Rhodes, Patmos, Samos, Lesbos and Lemnos, all of them famous in legend and history. It was of these islands of the Aegean that Byron wrote—

> The isles of Greece, the isles of Greece,
> Where burning Sappho loved and sung!
> * * *
> Eternal summer gilds them yet,
> But all except their sun is set.

AEGINA, *e ji' na,* or **EGINA,** a Greek island in the Gulf of Egina, for the most part mountainous and barren, but producing in its level western portion the best almonds which are grown in Greece. It is about eight miles long and the same in breadth, has a steep, deeply-indented coast, and affords but one harbor. The inhabitants are engaged in trade, seafaring and agriculture. The chief crops in addition to almonds are olives and grain. Aegina was celebrated in ancient times for its beautiful buildings. Population, about 8,200.

AEGIS, *e' jis,* the shield fashioned by Vulcan which Jupiter was thought to shake when it thundered, and which Minerva carried as a sign of her authority whenever intrusted with a mission by her father. It is frequently mentioned in the *Odyssey* and the *Iliad* and is described in legends as having the head of the Gorgon for its center. See MYTHOLOGY, and the articles on each of the gods named.

AENEAS, *e ne' as,* one of the most famous heroes of ancient legend, a Trojan warrior who was second only to Hector in the part he played in the Trojan War (which see). He was the son of Venus and of Anchises, and was chosen to lead a band of followers to a new land in Italy, and there to found a new nation. The story of his wanderings after the fall of Troy is told in Vergil's *Aeneid.* See AENEID; TROY.

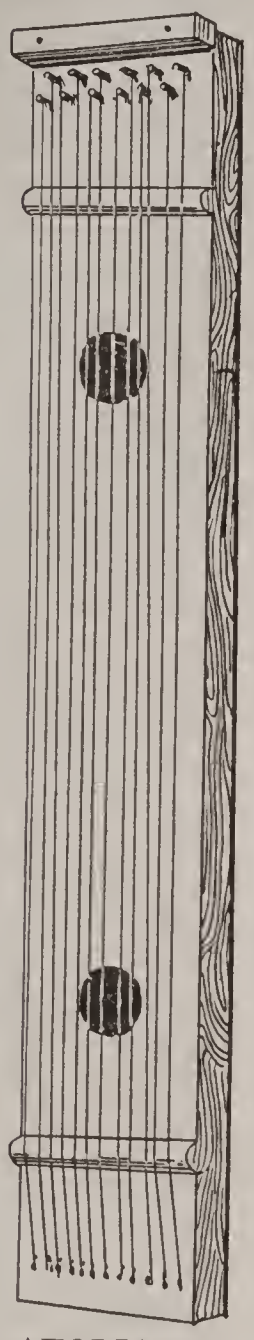
AENEID, *e ne' id,* one of the world's great epics, written by the Roman poet, Vergil. It is divided into twelve books, and relates the wanderings and adventures of the Trojan hero Aeneas. Though Vergil used the Greek epics the *Odyssey* and the *Iliad* as his models, his purpose in composing this, his masterpiece, was the glorification of Rome and of the line of Julius Caesar. His desire to revive interest in the ancient mythology caused him to introduce gods and goddesses, and these he pictured as taking an active interest in the affairs of mortals. All the misfortune that comes to Aeneas is due to the relentless hatred of Juno, while Venus, mother of the hero, labors to thwart the scheme of the queen of heaven.

The story, briefly told, is as follows: In the sixth year of his wanderings after the fall of Troy (see TROY), Aeneas, accompanied by his friend Achates, is sailing from Sicily to Italy. In the course of a terrible storm, brought about by Juno, he is shipwrecked upon the African coast. There he receives aid from Dido, queen of Carthage, and to her he relates the story of the fall of Troy, the destruction of the city by fire, his escape to Mount Ida, and his perilous wanderings until he reached Sicily, where his father, Anchises, died. Under the influence of Venus, Dido falls in love with Aeneas, and to him offers her hand in marriage. But the gods have other plans for the hero, and Mercury is sent by Jupiter to command him to continue his journey. As he sails away from Carthage he looks back at the flames from the funeral pyre of the heart-broken queen, who has committed suicide. When Aeneas finally comes to Italy he visits the Sibyl of Cumae, who leads him to the lower regions. There he sees his father, and learns from him that he is to be the founder of a glorious race—the race from which Augustus, ruler of Rome at the time the poem was written, was said to have descended.

After he arrives in Latium, his destination, Aeneas enters into a treaty with Latinus, a neighboring king, and is promised the hand of the latter's daughter, Lavinia. Though Juno strives to break the treaty, and brings on a war with other rulers, the Trojans are finally victorious. For a discussion of the literary merits of the poem, see VERGIL.

AEOLIAN, HARP, a stringed instrument which is played upon by the wind (see AEOLUS). It generally consists of a box of thin, fibrous wood, to which are attached from eight to fifteen fine catgut strings or wires, stretched on low bridges at each end, and tuned in unison. It is placed in a window or

other aperture, and when the wind causes the strings to vibrate it produces beautiful harmonies of sound, which swell or die away as the breeze varies in strength.



AEOLIAN HARP

AEOLIANS, *e o′ li anz,* one of the four divisions into which the ancient Greeks were divided. They were mostly island-dwellers, inhabiting the islands of the Aegean Sea, though some lived along the coast of Asia Minor. A literary and imaginative people, they seem to have given birth to the stories which Homer made immortal in the *Iliad;* and their genius reached its highest point in the poet Sappho, about the seventh century B. C.

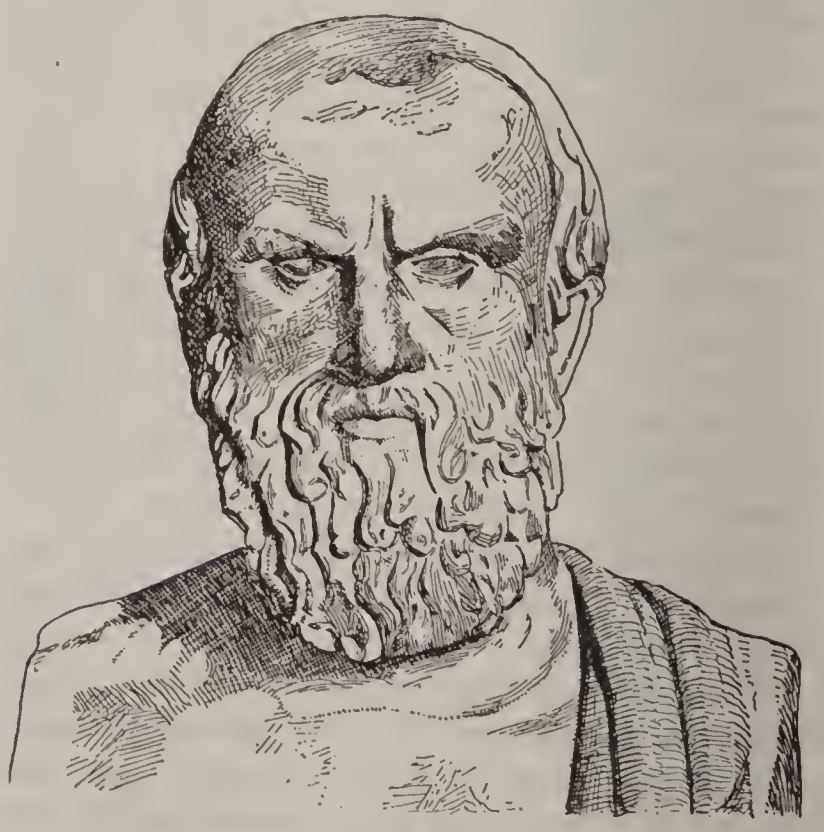
AEOLUS, *e′ o lus,* a Greek god, to whom was assigned the troublesome task of caring for the winds. His boisterous charges were shut up in a cave in the Aeolion Islands, and a noisy, breezy place it was. According to some accounts he might release them as he wished, but others declared that he could do it only at the command of Neptune. His name was given to the Aeolian harp (which see).

AEROPLANE. See FLYING MACHINE.

AESCHINES, *es′ ki neez* (389-314 B. C.) a celebrated orator of ancient Athens, the rival and opponent of Demosthenes (which see). He headed the party in Greece which favored an alliance with Philip of Macedon, while Demosthenes took the opposite side. Having failed in 330 B. C. to convict Ctesiphon of treason in having proposed to bestow a crown of gold upon Demosthenes for his services to the state, he withdrew from Athens. Later he established a school of eloquence at Rhodes.

AESCHYLUS, *es′ ki lus,* (525?-456 B. C.), one of the world's great writers of tragedy. Ancient Greece produced three whose tragedies have never been surpassed—Aeschylus, Sophocles and Euripides; and of these Aeschylus was the first. Unfortunately, of the ninety plays which he is supposed to have written, only seven and a few fragments still exist. These are enough, however, to prove that his own age did not rate him too highly, for he has treated in a masterly manner his exalted, somber themes. Most of his tragedies were arranged in groups of three, and of those which have been preserved *Agamemnon, Choëphori* and *Eumenides* form such a triology. The others are *The Persians, The Suppliants, Prometheus Bound* and *The Seven Against Thebes.* Mrs. Browning had an especial admiration for Aeschylus; she wrote a poetical version of *Prometheus Bound,* which is therefore probably better known to English readers than any other drama of Aeschylus.

The details of the life story of Aeschylus are shadowy. Born of a noble family, which traced its descent to the famous Codrus, king of Athens, he entered the army and fought against the Persians for the glory of the city of which he was so proud. Athenian victories increased his patriotic fervor, and many of his plays had as their central theme the exalting of Athens. He won his first prize in the great dramatic competitions in 485 B. C., and twelve other like successes followed. One great disappointment he had in his later years. He himself had fought at Marathon and had won public honors for his bravery, and he entered the contest for a prize offered for the finest elegy on those who fell on that field; but he was defeated, Simonides winning the prize.



AESCHYLUS

Tradition declares that the later life of Aeschylus was spent largely in Sicily, and relates an incredible legend as to the manner of his death. An eagle, it is said, flying far above him, dropped from its talons a tortoise, which struck Aeschylus on the head and killed him. The Greeks seem to have found pleasure

in assigning this almost unusual death to a man who had made his heroes die in the fashions of gods. Tragedy owed much to Aeschylus, for it was he who first suggested appropriate costumes and scenery and introduced more than one actor. A.MC C.

AESCULAPIUS, *es ku la' pi us,* in Greek and Roman mythology, the god of the art of healing, son of Apollo and the nymph Coronis. When a youth he was placed in care of the centaur Chiron, who taught him what he knew of medicine. Aesculapius, according to the legend, became so versed in his art that he could restore the dead to life. This angered Pluto, the insatiable lord of the underworld, and at his request Jupiter slew the god of medicine with a thunderbolt. Aesculapius is represented in art as bearing a knotted staff; around this was entwined a serpent, which the ancients regarded as the symbol of health.

AESOP'S, *e' sop's,* **FABLES,** a collection of fables which have been for over two thousand years popular with children and adults alike, the world over. They are for the most part beast fables, wherein the animals are given the qualities and the powers of human beings. Children love them chiefly for the story, though the clearly suggested moral by no means detracts from their charm; while older people delight in them because they set forth in few words and in pleasingly dramatic force truths and bits of wisdom. So widespread are they that acquaintance with them may safely be taken for granted in almost any company, and allusions to "sour grapes," to "belling the cat" or to "the lion and the mouse" are constantly heard.

Aesop, the supposed author of these immortal fables, is a legendary character. Many tales are told of Aesop, a Greek slave, who was far more wise than his masters, and who became a friend of Solon and of Croesus, and it may be that certain of the popular beast fables did originate with him. But these fables were not written down until long after Aesop is supposed to have lived, and it seems more than likely that they simply grew up, like folk tales, and had no single author.

Consult the articles FABLE and STORY-TELLING for examples of the fables of Aesop.

AFFIDA'VIT, a sworn statement containing evidence to be laid before a judge. It is sometimes employed when it is not possible for a witness to appear personally to testify; frequently, however, all the testimony in a case is in the form of affidavits, these being preferred rather than that the court's time shall be consumed by the hearing of oral testimony. The person making an affidavit signs his name at the bottom of it, and swears that the statements contained in it are true. Penalties for false swearing are severe. See OATH.

AFFIN'ITY, in chemistry, the force or tendency through which two or more substances unite to form a compound in which the properties of each individual substance are lost; the two light colorless gases, oxygen and hydrogen, for example, unite to form water, and the metal, sodium, and the yellowish-green gas, chlorine, unite to form common salt. It follows that affinity is also the force which holds the elements together if they are in combination. This force, whatever it is, is called affinity because it is evident that some hidden relationship between substances makes them combine. One ingenious chemist suggested that the particles into which matter is ultimately divided all had minute hooks with which they grasped each other. Gravity and electricity have also been suggested, but none of these theories has been proved.

In some elements, such as oxygen and chlorine, this force is strong, and these may be combined with many other elements; others, like nitrogen, seem to have an affinity for only a few elements. Among the metals, sodium, potassium, calcium and aluminum have strong affinity for such non-metals as oxygen and chlorine; while gold and platinum have so small a tendency to combine with other elements that the alchemists called them "noble" and even "royal" metals. For the same reason the gases helium, argon and neon, which appear to be without affinity for any of the other elements, are called "noble" gases. J.F.S.

AFGHANISTAN, *af gan' i stan,* a small country in South Central Asia, one of those defenseless nations of yellow and black men which have bowed to the superior white power of Europe —in this instance Great Britain. Its importance to Britain lies not at present in its wealth, for whatever of riches it holds is yet almost unknown, but in its position between Russian Turkestan and British

The location of Afghanistan in the continent of Asia is shown in black.

AFGHANISTAN

Native Type

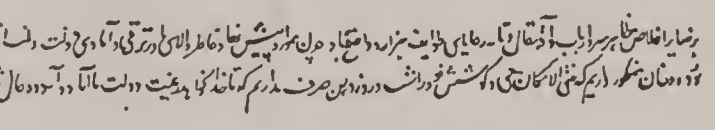
On the Overland Road to India

Native School

Afghan Soldier

Village Architecture

Afghan Threshing Machine



Specimen of Writing

India, which makes it an effective barrier against the encroachment of Russia upon England's marvelously rich peninsula of India. The country is independent of British authority in local matters, but by treaty Britain controls its foreign relations and thus is fortified against any power that may threaten. Afghanistan's boundaries are not at all points accurately defined, but it contains about 245,000 square miles, so it is not quite as large as Texas, but about the size of Ohio, Indiana, Illinois, Wisconsin and Michigan, combined.

The People and Their Surroundings. There are about 6,380,500 people in Afghanistan, of many races and clans; most of them are of the native stock called Afghans, and nearly all of these are tribesmen who like to quarrel and who are more or less a law unto themselves. Authority is intelligently exercised in the cities, of which Kabul, with about 150,000 people, is the capital, situated in the eastern part of the country. Other cities are Kandahar, Herat and Ghazni.

The country is rough, and largely inaccessible; travel is difficult over the mountains of the Hindu-Kush range, which rise in some places to 18,000 feet, and over the smooth tablelands, which have an elevation of 4,000 to 7,000 feet. Only along one trail, from Kabul to Herat, can a wagon be hauled with ease; transportation elsewhere throughout the country is by camels and horses. Commerce is therefore carried on with difficulty, but notwithstanding these natural obstacles, the turbulent attitude of many of the inhabitants and the primitive modes of life, there is considerable trade. Lying at all elevations, from deep, intensely hot valleys to great heights with bitter cold, it produces every kind of grain, but principally wheat and barley, as well as many fruits and much tobacco. The mineral wealth is really great, but largely undeveloped; yet considerable gold, silver, mercury, copper, iron and lead is taken out of the country by caravans, and enough coal is mined to meet the country's needs. The manufactures are limited to the simple needs of the people, and this condition will doubtless long continue.

Not all of Afghanistan is fertile, nor even half of it. Over much of the area the mountainous condition makes agriculture impossible, and nearly half of the whole country is almost, if not entirely, a desert. The valleys afford the only extensive cultivable area.

Government. Afghanistan is a monarchy, under a hereditary ruler, called *ameer*. In reality, the ameer's authority is practically absolute, for autocratic power is needed among a people given to the idea that might makes right and who love a quarrel better than do the people of any other country. The monarch and his governors exercise authority when and where they can, and defend their power when they must.

History. Alexander the Great was probably the first invader of Afghanistan. He founded the present city of Hĕrat, called then Alexandria Arion, and began the building of Kandahar. The great Genghis Khan (which see) conquered it in the twelfth century and at his death it fell to one of his four sons. Britain's entry into the affairs of the nation was in 1839, when a force entered the capital and placed a native prince of its choice upon the throne. The native people conspired against the foreign authority, and in 1841 murdered many Englishmen in the capital city. The effort to maintain British supremacy was temporarily abandoned, and in the retreat of the forces to India thousands were slain. Through Khyber Pass, the only entrance to the country from the south, another army was sent the next year, and Kabul again fell under British authority.

At this point Russian influence from the north began to be felt, and Russian armies, approaching from Turkestan, presented a situation which nearly led to war between Russia and England, but a settlement of boundaries of spheres of influence averted a conflict. The rulers of Afghanistan have of late years strictly observed the treaties which England forced from them. The British Empire controls all of the country's foreign relations, and in turn gives the ameer an annual subsidy.

Other Points of Interest. The name *Afghan* is supposed to mean *noisy and tumultuous,* and it is certainly well deserved.

The Afghans claim to be Jewish, the descendants of Ishmael, and they do indeed have a Jewish cast of countenance; but scholars believe nevertheless that their claims are unfounded.

An Afghan feels that it is beneath his dignity to keep a shop or engage in any handicraft.

The women are rigidly secluded.

The Afghans are, apparently, very hospitable, and cry "May God protect you" after the departing guest. But the obligations of hospitality hold only while the guest is within the house, and an Afghan will follow his guest and rob him of all he possesses.

Outline and Questions on Afghanistan

I. Location

(1) Latitude—29° to 38° 30′ N.
(2) Longitude—61° to 75° E.
(3) Boundaries—See map of Asia
(4) Gateway to India

II. Physical Characteristics

(1) Size
  (a) Comparative
  (b) Absolute
(2) Surface features
  (a) Mountains
  (b) Tablelands
  (c) Valleys
  (d) Deserts

III. Climate

(1) Temperature
(2) Causes

IV. People

(1) Character
(2) Occupations
  (a) Agriculture
  (b) Mining

V. Government

(1) Hereditary ruler
(2) British control
(3) Cities

VI. History

(1) Early invasions
(2) British influence
(3) Russian interference

Questions

How does the area compare with that of Germany? Of Saskatchewan? Of France?

Why does England value her hold on Afghanistan?

Are the Afghans well named?

What is the religion of the Afghans?

Could tourists travel through the country in an automobile?

Does Great Britain really possess the country as it does Canada?

Is the hospitality of the Afghans true hospitality?

Is there any justification for the autocratic rule of the ameer?

What city of Afghanistan can claim a very distinguished founder?

What nation has contended with Great Britain for control of the country?

Has the country a railroad?

The people have a particularly stalwart appearance, but despite that fact and despite the dry, much-boasted climate, they have little endurance, and fall an easy prey to disease.

There are no fewer than ninety-eight rivers in the country.

In some places, notably in Kabul, deep snow lies on the ground for two or three months, and the people make little or no attempt to leave their homes.

The carpets woven by the nomads about Herat are beautiful, and are often sold abroad as Persian carpets.

In certain parts of the country the staple foodstuff is flour made from dried mulberries.

The fruits of Afghanistan are specially famous, and in the dried form are exported in large quantities.

With the exception of Turkey, Afghanistan is the strongest Mohammedan country on the globe. E.D.F.

Consult Hamilton's *Afghanistan.*

AFRICA, the second largest land mass on the globe, the "Dark Continent" of a generation ago, which is still, despite exploration and enterprise, shut off from civilization throughout many of its regions. In reality it is a great peninsula of Europe-Asia, though through all historic times there has been no land connection with Europe, and that with Asia is limited to the Isthmus of Suez. Its area of 11,500,000 square miles is greater than that of any other continent except Asia, surpassing that of North America by over 3,000,000 square miles. In length it is 4,960 miles, its greatest breadth is about 4,500; so that a rectangle drawn to include it would be almost a square. At very near its central north and south point the equator crosses it, and thus it stretches from about the latitude of Richmond, Va., to that of Buenos Aires. The Pacific ocean nowhere touches this vast continent, which has the Atlantic Ocean on the west and south, the Indian Ocean and Red Sea on the east, and the Mediterranean on the north.

Form and Coast Line. In general, Africa resembles North and South America in its shape—that is, it is roughly triangular, with the widest part to the north; but it does not taper sharply toward the south, as do the others named. In school it is usually the first continent assigned for drawing, because it is the easiest of all. This is due to the fact that its coastline is very regular, with none of the deep gulfs and bays and sharply projecting peninsulas which mark the northern coast of North America, for example, or that of Norway. There are two interesting facts connected with this; Africa has the shortest coast line in proportion to its area of any continent, and it has almost no good harbors. The first of these facts is strikingly apparent if we consider that this second greatest of the continents has a coastline of only 19,000 miles, while little Norway, if all its indentations are followed, has a coast line of 12,000 miles. Just what effect the absence of harbors has had on the history of Africa it is impossible to say, but undoubtedly, taken in connection with the difficulty of navigating the rivers, it helped largely to keep the interior of the continent for centuries an unknown land.

Nor has Africa at any point the fringe of islands, large or small, which make picturesque the coast of Chili, of Canada or of Norway. One island, Madagascar, the fourth largest in the world, lies 250 miles to the east, but the channel which separates the two is so deep that Madagascar seems less closely connected with Africa than Africa does with Asia and Europe. The other islands, for the most part small and of no great importance to Africa, include the Madeira, Canary and Cape Verde islands, in the Atlantic, and Reunion, Mauritius and Zanzibar in the Indian Ocean. To-day the products which these islands export are taken mostly to Europe, but some day, with the greater development of Africa, a closer connection will doubtless be established with the mainland.

Surface. It is not only in its coastline that Africa lacks variety; a sameness is to be observed also in its surface structure. This does not mean that it is actually monotonous;

SOMALILAND FAMILY. Under European influence Africans are building better homes, dignifying the family and wearing more clothing.

but there are no mountain systems like the Rockies and Andes in the two Americas, no wide fertile valleys like that of the Mississippi, no region like that of the Alps, where for scores of thousands of square miles mountain is piled on mountain. In general, Africa is a great tableland or plateau which in some places runs abruptly to the very coast, but in others leaves a narrow coastal plain. The average height of this plateau is 2,130 feet, but while in the southern part of the continent land less than 2,000 feet above the sea is unusual, except in the coastal plains, in the northern part land above that elevation is the exception. The line dividing the higher plateau regions from the lower extends roughly from Suakin on the Red Sea to the head of the Gulf of Guinea.

North Africa. It is in the lower northern part that there occurs the highest mountain range, the Atlas. This runs parallel to the Mediterranean coast and attains in its western half a considerable height, some of its peaks exceeding 14,000 feet. The coastward slope of these mountains is gentle, and plains occur at their base, but to the south they drop abruptly and at one point are bordered by a depression which is below sea level. The other outstanding highlands of North Africa are three: a north-and-south elevation along the shore of the Red Sea; a long ridge which runs from northwest to southeast across the center of the regions, and a comparatively low range at the head of the Gulf of Guinea. The one outstanding feature of the continent, more or less familiar to every child, is the great Sahara Desert, stretching from coast to coast excepting a narrow strip along the Nile River. This great barrier between the north and south is described in its proper place in these volumes.

South Africa. Though South Africa has not the largest mountain range, it has many high peaks, for Kenia and Kilimanjaro rise to heights over 18,000 and 19,000 feet. These are close to the equator and are old volcanic craters, but the Ruwenzori, which is a range rather than a peak and rises to a height of 16,800 feet, is of the folded variety of mountains—that is, it is due to a lifting and bending of the earth's crust, and not to a heaping up of lava.

The most important highland of the whole continent is the so-called *plateau of Abyssinia,* which begins in the country from which it takes its name and extends far to the south until it ends in the Drakenburg Mountains. In this great plateau there occur sharp furrows, or rift valley cracks left by some disturbance of the earth's surface in past geologic ages; and in these basins are found the great lakes.

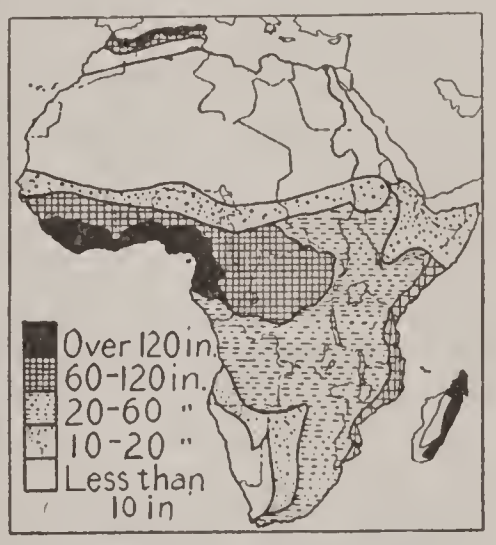
Rivers and Lakes. Africa has five large rivers—in the order of their length the Nile, the Congo, the Niger, the Zambezi and the Orange; and of these the Congo is second only to the Amazon among the rivers of the world in the volume of water it carries to the sea (see article on each river named). But these rivers, except the first named, have had no such effect on the history and commerce of the countries they traverse as have the Mississippi and the Saint Lawrence; for in common with other African rivers they have one great fault as waterways. Rising in the high plateaus, they drop down the successive terraces toward the coast in a series of waterfalls which make for picturesqueness and beauty but not for navigation. As the development of the continent goes on, however, under the guidance of Europeans, this difficulty is being surmounted in many places by the building of railroads about the falls.

The Zambezi is the only one of the great river systems which discharges its waters into the Indian Ocean, for the drainage of Africa, like that of most of the other continents, is into the Atlantic. However, about one-third of the vast territory sends no waters into the sea, and in this proportion of its interior drainage Africa surpasses all other continents except Asia. Much of this inward-flowing water finds its way into Lake Chad, in the Sudan—a large, shallow body of water which remains fresh despite the fact that, except in times of flood, it has no outlet.

This second largest of the continents, which boasts next to the largest river in the world, also possesses the largest fresh-water lake but one, for Victoria Nyanza is surpassed only by Lake Superior. It lies in the eastern part of the continent, and its northern boundary touches the equator. To the west of this great lake stretches a chain of smaller bodies of water which occupy one of the rift valleys and lie at a greater height above sea level than most other lakes of the world. These are Tanganyika, the longest lake in the world, and one of the deepest; Kivu Albert Edward Nyanza and Albert Nyanza. Other noteworthy African lakes are Tsana, in Abyssinia, Mweru, and Bangweolo, the last-named of which is little more than a morass except in the rainy season.

Climate. North America stretches from well within the tropics to the Arctic Circle, and in consequence has a climate which runs through all degrees from torrid to frigid. Africa, on the other hand, lies almost wholly within the tropics, and has therefore a much more even temperature. And that temperature is almost uniformly high, for cooling sea breezes are shut out by the steep edges of the plateaus which everywhere border the coast. The variation in temperature throughout the year is not more than 20°, while North America has in many places a range three times that great. The extreme southern part of the continent is the only region which has not a tropical climate, though there are places farther north where unusual elevation assures pleasant climatic conditions.

Africa is deficient in rainfall, except in the regions bordering the equator. Here there are two seasons of especially heavy rainfall, though there is considerable rain every month in the year. Northward and southward from this belt it diminishes rapidly, and over portions of the Sahara no rain ever falls. In the south, too, there is a stretch of desert land, the Kalahari, but this is not so dry as the Sahara, having enough moisture to make it a profitable grazing country. To the north of the Sahara and south of the Kalahari there is one rainy season during the year, and agriculture may be successfully practised. The surface structure of the continent has as much to do with its lack of rainfall as with its temperature, for moisture-bearing winds do not reach the interior. Indeed, so dry and hot are the winds which blow over parts of the continent that they absorb the moisture from the lands over which they pass and make them yet more arid.



RAINFALL CHART

The highest parts of the plateaus of Africa, as well as the more temperate northern and southern portions, are healthful for Europeans as well as for the natives; but the damp equatorial regions abound in fevers and are considered the most unhealthful places in the world. Even the natives in these parts are short-lived, for the fevers attack them as well as the newcomers. In a few places improved sanitation has been introduced since the coming of the Europeans, and the result has been a markedly lower death rate.

Vegetable Life. The above account of the climate and rainfall tells the story of the vegetation as well. North of the Atlas Mountains conditions are much like those of Southern Europe, and the oak, olive, semi-tropical fruits, and grains flourish. In Algeria and Tunis wheat is successfully raised, and Morocco has a region which offers like possibilities. In the time of the Roman occupation, before the Christian era, this northern belt was the granary of the world.

AFRICAN PHYSICAL MAP
Showing vegetation zones.

South of the Atlas the slope is abrupt to the Sahara Desert, where the sandy, salty soil affords life to little except a few thorny shrubs. In the oasis, however, where buried springs come to the surface, there is a pleasing contrast, for grass, date palms and grain clothe the surface with green (see Oasis). To the south of the Sahara, as well as in the more southerly parts of the continent where there is one rainy season a year, lie the great savannas, or prairies, where grass grows luxuriantly and the baobab tree flourishes. It is on these savannas that the farms, whether for cattle and sheep or for ostriches, have been established. The temperate region of the south has many trees and flowers which grow nowhere else, for the Sahara Desert, stretching from sea to sea, is a barrier that cannot be crossed by plant forms.

Throughout most of the equatorial region, where rainfall is plentiful, there is a dense tropical forest. No other forests except those of the Amazon equal in size, in density, and in variety of trees that which extends almost across Central Africa. The vines and underbrush are so luxuriant that throughout much of this vast extent the sun seldom if ever penetrates to the ground. No one can even begin to estimate the wealth in timber, vegetable oils and other plant products hidden in this forest of giant trees.

AFRICA'S MOST NOTABLE ANIMALS

Giraffe

Head of Zebra

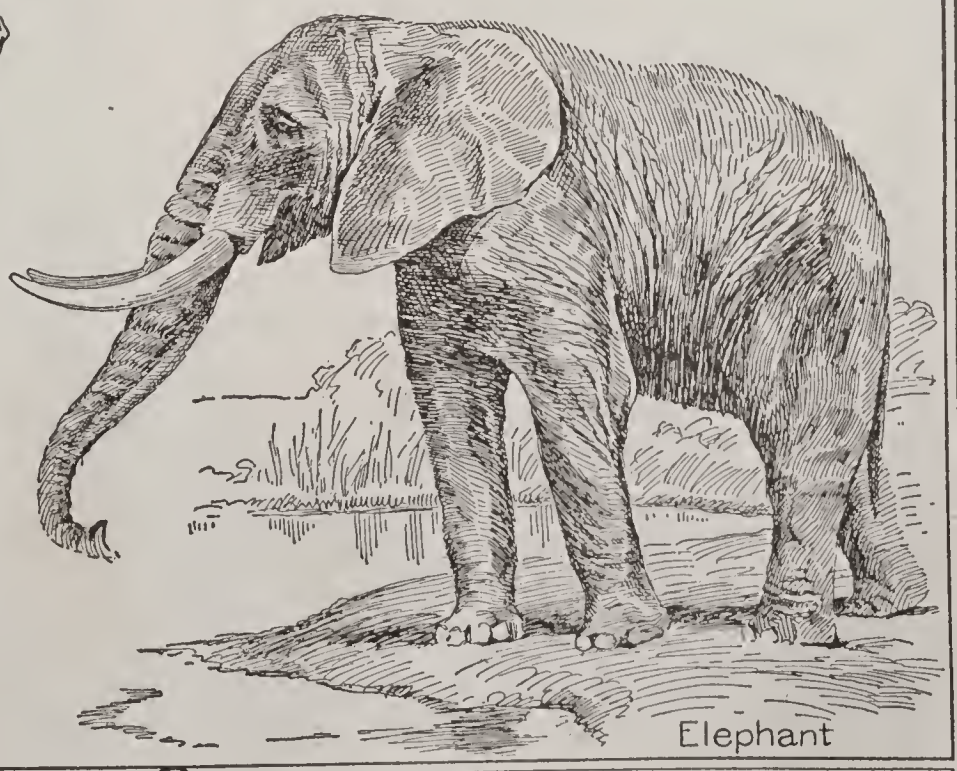
Hippopotamus

Chimpanzee

Lion

Ostrich

Camel



Elephant

Animal Life. As the climate and rainfall govern the vegetation, so the latter determines the distribution of animal life. It may be said in general, however, that Africa is the home of the largest members of the animal kingdom, some of which live there exclusively; and that, for the most part, all regions south of the Sahara, whatever their latitude, have about the same forms of animal life if their plant life is similar.

Northern Africa has much the same animals as Southern Europe, but south of the Sahara distinctive characters appear. Over the grassy savannas, which with their scattered forest areas afford shelter for such animals as feed upon the grass of the prairies, range the buffalo, the rhinoceros, the gnu, the zebra, almost 100 kinds of antelope, and the giraffe, which is peculiar to Africa. Where these grass-eating animals are to be found, there also are the flesh-eating animals which prey upon them—the lion, the panther, the leopard, the hyena and the jackal. The bear and the wolf are found nowhere in Africa. Formerly elephants were very common in all parts of the continent, but they have been so persistently hunted for the ivory of their tusks that there is danger of their complete extinction. In the swamp and river regions are to be found crocodiles in large numbers, as well as the hippopotami, which live nowhere but in Africa.

It might seem that the great forests near the equator would furnish just the sort of homes that animals might desire, but one of the outstanding features of the life of the continent is the scarcity of life in these regions. Even the largest animals find the plant growth too dense, so these great tracts are given almost exclusively to reptiles, insects and the great monkeys, the chimpanzee and the gorilla, which are peculiar to Africa. Numerous other species of monkeys live in the less dense forests farther south, and on the southern savannas dwells the ostrich, which is to be found native nowhere outside of Africa. The reptile and bird life is abundant, many of the birds being characterized by their brilliant feathers. Song birds are not as common as they are in North America, and most of the gorgeous birds have but indifferent voices.

With the exception of the great journeys of exploration, discussed below under the subhead *History,* the most famous of African expeditions was that undertaken by Theodore Roosevelt in 1909-1910. It was purely scientific in its object and sent back to the Smithsonian Institution (which see) a larger number of big game specimens than were ever before secured by any other single expedition.

More destructive by far than the great animals of Africa and far more important as a cause of the backwardness of the continent are the insects, which swarm everywhere. The white ants ruin frame buildings by hollowing out the timbers; the locusts make farmers poor by devouring the crops, and the tsetse fly has a bite which is fatal to dogs, horses and cattle, and which in some instances is believed to transmit sleeping sickness (see Tsetse Fly; Sleeping Sickness). But perhaps the greatest pest of all is the mosquito, which spreads by its bite the tropical fever, and so makes large parts of the continent uninhabitable.

Mineral Wealth. When the mineral resources of Africa are referred to, diamonds and gold are at once brought to mind, and these are indeed the most valuable. The center of production for both lies within the Union of South Africa, the Transvaal ranking next to Australia and the United States in the production of gold, and Kimberley exporting nine-tenths of the world's supply of diamonds. See Diamond; Gold; Kimberley; South Africa, Union of; Transvaal.

South Africa also bids fair to produce a large amount of coal when its resources are further developed; great deposits of tin have been discovered in Nigeria, and the Belgian Congo has opened copper mines which seem practically inexhaustible. Thus it may be predicted that when the "Dark Continent" is more thoroughly known it will prove to be one of the world's richest treasure houses of minerals.

The People. Broadly speaking, Africa's population, estimated at about 140,000,000, is made up of two races, the white and the black. It is not, therefore, strictly correct to use the term *African* as meaning the same as *negro,* as is so often done. But to eyes accustomed to looking upon the Caucasians of Europe and North America, the *white* men of Africa would not look white, for they have been burned by century after century of tropic sun. Indeed, the division between the two races is made according to the shape of head and features, and language, rather than according to color. North and east of the Sahara the white race is to be found; south of that barrier the black; and, as is natural, on the borderland between the two is a mixed race.

Just south of the white man's country, in a broad strip called the Sudan, are the most

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ECONOMIC MAP OF AFRICA

SCALE OF MILES

0 100 200 400 600 800

REFERENCE

- Industrial Districts
- Agricultural Regions
- Non-Productive "

Principal Workings:

- Coal
- Iron
- Tin
- Copper
- Gold
- Diamonds

Agricultural products are indicated by initial letters in districts where the products are largely obtained.

B	Barley	Ol	Olives
Ca	Cacao	P	Oil Palms
Cf	Coffee	Ru	Rubber
Ct	Cotton	Su	Sugar
D	Dates	T	Tea
G	Ground Nuts	To	Tobacco
Iv	Ivory	V	Vineyards
M	Maize	W	Wheat

——— Navigable Rivers

Hammond's Economic Map of Africa
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20° Longitude West 10° from Greenwich 0° 10° Longitude 20° East 30° from 40 Greenwich 50

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VEGETATION MAP OF AFRICA

SCALE OF MILES
0 100 200 400 600 800

REFERENCE

Natural Vegetation

- Alpine Flora
- Temperate Forest
- Evergreen Trees and Shrubs
- Temperate Grasslands
- Semi Desert
- Desert
- Oases and Nile Valley
- Tropical Grasslands
- Equatorial Forest
- Swamp

Hammond's Vegetation Map of Africa
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POPULATION MAP OF AFRICA

SCALE OF MILES
0 100 200 400 600 800

REFERENCE

Density of Population to the square mile.

- Under 1 inhabitant
- 1-8 inhabitants
- 8-16 "
- 16-32 "
- 32-64 "
- 64-128 "
- 128-256 "
- over 256 "

Towns with over 50,000 inhabitants.

Hammond's Population Map of Africa
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POLITICAL MAP OF AFRICA

SCALE OF MILES

0 200 400 600 800 1000 1200

EUROPEAN POSSESSIONS

- Great Britain
- Belgium
- France
- Italy
- Spain
- Portugal

Railroads

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A TYPICAL VILLAGE IN THE REGION OF THE EQUATOR

northerly of the true negroes, and the blackest. It was in this region that the slave-dealers carried on their trade, and most of the negroes in the United States to-day are descendants of Sudan negroes. Southward, and beginning just north of the equator, is the Bantu family, a collection of tribes of light-colored negroes who are connected rather by a common language than by any physical peculiarities. These Bantus occupy all the remaining part of Africa, except the southwestern corner where live the Hottentots and Bushmen (which see). Tribes of very small, as well as very large, people occur at intervals in Africa, and it is believed that the sight of these gave rise to many of the popular tales of dwarfs and of giants. Of Europeans and Americans there are only as many as are needed to control the numerous enterprises, private and governmental, which have been opened up in various parts of the continent.

Religiously the continent is still "darkest Africa," for almost sixty per cent of the people still hold to the old heathen superstitions which make right, and even necessary, demon-worship, fetishism (see FETISH), and barbaric cruelty. Over a third of the whole population are Mohammedans, and the remaining five or six per cent are Christians of one branch or another.

Division Into Countries. The following statement has reference to conditions just before the outbreak of the War of the Nations, in 1914. There will probably be more extensive rearrangements of territory in Africa at the close of that struggle than in any other continent.

Africa contains two independent countries, Abyssinia and Liberia, but together they possess less than five per cent of its area. Except for a neutral zone of 140 square miles at Tangier, all the rest of the continent is divided among seven European nations as follows:

Belgium. Congo, formerly the Congo Free State; area, 909,654 square miles; population, about 15,000,000.

France. Algeria, Congo, Madagascar, Mayotte, Comoro Islands, Somali protectorate, Senegal, Guinea, Ivory Coast, Dahomey, Upper Senegal and Niger, Niger territory, Mauritania, Tunis protectorate, Morocco protectorate; area, about 3,000,000 square miles; population, perhaps 40,000,000.

Germany. Until 1916, Kamerun, East Africa, Southwest Africa, Togoland; area, 931,460 square miles; lost in the War of the Nations.

Great Britain. East Africa protectorate, Uganda protectorate, Zanzibar protectorate, Nyassaland protectorate, Rhodesia (governed by the

NORTH AFRICAN CIVILIZATION

Beggar in Tripoli

Member of a Wandering Tribe

Street in Cairo

A Laundry Girl of Tunis

The Morning Prayer in the Desert

A Falconer in Morocco

Arab Encampment on the Fringe of the Desert

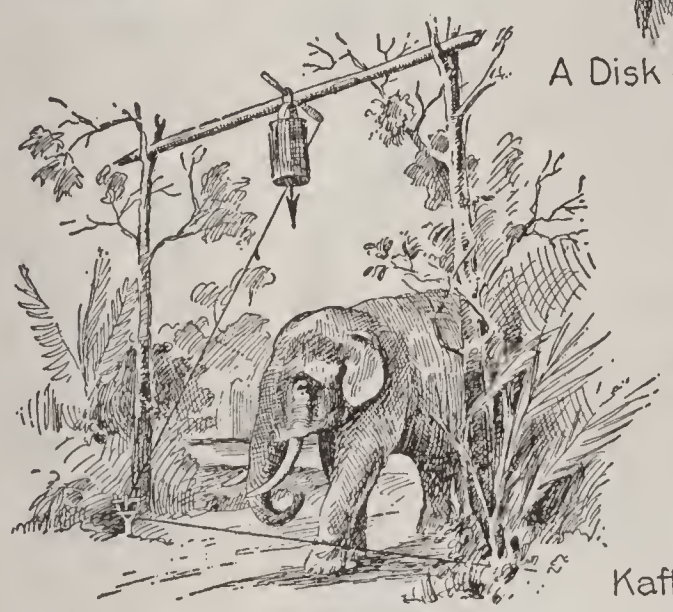
Oasis in Northern Sahara

AMONG NATIVE AFRICAN TRIBES

The Telephone Is Only a Home-made Plaything

Native Art Specimens

Calendar of Knotted String



Certain Death to the Elephant

A Disk of Wood in the Upper Lip as a Beautifier

Kaffir Woman's Head Dress

Friction Method of Fire Building Still Employed

Village Scene:
Women Pounding, Sifting and Grinding Meal

OWNERSHIP OF AFRICA BEFORE THE WAR OF THE NATIONS

B stands for British possessions, F for French, G for German, P for Portuguese, S for Spanish, I for Italian, Bel for Belgium. Since the war began Great Britain has formally declared a protectorate over Egypt and the Sudan. The South Africans conquered German Southwest Africa for Britain. The French and British together conquered Togoland and Kamerun. The British in 1916 won German East Africa. Germany was deprived of all its possessions by the treaty of peace.

British South Africa Company), Swaziland, Union of South Africa, Nigeria colony and protectorate, Gambia colony and protectorate, Gold Coast colony and protectorate, Ashanti, Sierra Leone colony and protectorate, Egypt protectorate, Sudan; area, over 3,000,000 square miles; population, about 50,000,000.

Italy. Eritrea, Somaliland colony and protectorate, Tripoli and Cyrenaica; area, about 600,000 square miles; population, about 1,400,000.

Portugal. Cape Verde Islands, Guinea, Saint Thomas and Principe, Angola, Mozambique; area, 793,980 square miles; population, 8,245,032.

Spain. Canary Islands, Rio de Oro and Adrar, Guinea, Fernando Po, Morocco protectorate; area, about 100,000 square miles; population, about 2,500,000.

Other Items of Interest. Where the Strait of Gibraltar is narrowest, the coast of Africa is within nine miles of that of Europe. The towns nearest each other are Tarifa and Ceuta.

At a comparatively recent period, as geologists count time, Africa was joined to Asia all along the Red Sea; but there was an upheaval, a long, deep valley appeared, and water flowed in from the sea and separated the two continents.

The greatest heat in Africa is not, as might be supposed, at the equator, but ten or fifteen degrees north. Differences in altitude account for this.

The highest point in the continent is Kilimanjaro, 19,728 feet above sea level; the lowest occurs in the Sahara Desert, which is in places 150 feet below sea level.

The violent hot wind which blows across Northern Africa and helps to create the desert conditions is known as the *simoom.*

The manner in which oases are formed is most interesting. Far, far away, on the very edge of the desert, perhaps, an isolated mountain range forces the moisture from a sea wind. The heavy rainfall which results sinks into the sand and travels underground for hundreds of miles, it may be. And then, somewhere in the desert it finds its way to the surface, and a restful oasis, with grass and waving date palms, is formed.

The sands of the desert have buried many things out of sight. While a railroad was being built across the Sahara the workmen began the removal of a mound of sand, and beneath it they found a mosque and a number of houses—a whole village hidden by the shifting sand.

Mohammedans are bidden by the Koran to bathe frequently, and the Arabs obey the injunction; but since they hate water they bathe in sand.

The Desert of Sahara about equals in area the United States, with Alaska and its island possessions. It has at least four hundred oases.

The caravan trips across the desert are most hazardous undertakings. Usually there are from 1,000 to 1,500 camels in a caravan, and the journey takes fully three months. An average of one-third of the animals perish on the round trip, and occasionally a sandstorm of several hours' duration destroys a whole caravan—men, camels and goods.

Old people are not looked upon with respect by some of the native tribes. They are frequently led out into the forest and there abandoned, to die of starvation or to be killed by prowling beasts.

The pygmy tribes are wonderful hunters and are most ferocious. Indeed, they have been one of the chief obstacles to exploration.

Only two states of Africa, Abyssinia and Liberia, are independent.

The island of Madagascar is larger than any state of the United States except Texas.

Africa contains examples of the smallest and the largest of mankind. A.MC C.

History of Africa

The story of Africa is one of contrasts. At the dawn of history the continent was the home of the world's foremost civilization, that of Egypt. Later the empire of Carthage rivalled Rome, until it was overthrown and utterly destroyed in the last of the Punic Wars (which see). Under the sway of Rome, Africa's Mediterranean coast was still a vital section of the civilized world. Alexandria became a seat of learning, and there Ptolemy worked out his systems of astronomy and geography; Cyrene, farther west, was a city of prosperous traders, from which came that Simon to whom was given the burden of the Cross on the road to Golgotha; the land of Carthage gave birth to Saint Augustine, who made it a stronghold of active Christendom. But after the fall of Rome Africa's Mediterranean region sank into a barbarism nearly as gross as that of the unknown regions south of it. The Vandals poured in from the west, then the Arab Mohammedans from the east, and the period of Africa's glory was past.

During the Middle Ages Europe knew little of its southern neighbor, though Spain and Sicily were partly under the domination of the Mohammedans, and the Crusaders once invaded Egypt. In the fifteenth century Portuguese explorers sailed south along the Atlantic coast, and in 1488 the great navigator, Bartholomew Diaz (which see), rounded the Cape of Good Hope. Neither these voyages nor that of Vasco da Gama, who reached India by this route ten years later, excited attention in other countries, but the Portuguese quietly founded several of the colonies which they hold to this day. After the discovery of America fortunes began to be made in the slave trade; about the same time the discoveries of gold became known, and adventurers from Holland, France, England and other countries became active. In 1652 the Dutch settled Cape Town, though merely as a half-way port on the road to the Indies.

The Explorers. Toward the end of the period of Europe's great wars a lively interest in Africa was awakened, and the period of great explorations began. In 1770-1772 James Bruce traveled to Abyssinia, the little-known Christian island in the sea of Mohammedanism. In 1797 Mungo Park made known the Niger country, and after him came several less known but no less important explorers. In 1840 David Livingstone began his missionary journeys, in the course of which he crossed Africa from ocean to ocean, discovered Victoria Falls and explored the Zambezi region. In 1869, when Livingstone was thought to be lost, a Welsh-

OUTLINE AND QUESTIONS ON AFRICA

Outline

I. Position

(1) Latitude—37° 25′ north to 34° 50′ south.
(2) Longitude—51° 21′ east to 17° 30′ west

II. Size

(1) Length, 4,960 miles
(2) Breadth, 4,500 miles
(3) Area, 11,500,000 square miles
(4) Rank, second, only Asia surpassing it

III. Shape and Coast Line

(1) Roughly triangular, with greatest width in north
(2) Regular coast line
(3) Few good harbors
(4) Few islands
(5) Coast waters

IV. Surface

(1) General
  (a) Lacks variety
  (b) Great tableland with average height 2,130 feet
(2) Specific
  (a) Northern highlands
  (b) Southern peaks and Ruwenzori
  (c) Plateau of Abyssinia

V. Drainage

(1) Five great rivers
(2) Lakes

VI. Climate

(1) Even temperature
(2) General deficiency in rainfall
(3) Deserts
(4) Winds

VII. Vegetation

(1) Northern vegetation like that of Europe
(2) Desert conditions
(3) Savannas
(4) Tropical forest

VIII. Animal Life

(1) Largest members of animal kingdom
(2) Many forms found only in Africa
(3) Grass-eating animals
(4) Flesh-eaters
(5) Reptiles
(6) Birds
(7) Insects

IX. Mineral Resources

(1) Diamonds
(2) Gold
(3) Coal
(4) Copper

X. Inhabitants

(1) White
(2) Black

XI. Political Divisions

(1) Independent countries
(2) Dependencies

XII. History

(1) Ancient
(2) Early modern discoveries
(3) Modern exploration
(4) Discovery of mineral wealth
(5) Recent development

Questions

Why are children in school usually asked to draw Africa before North America, Asia or Europe?
Why is not Egypt a desert like the Sahara?
How many miles higher is the loftiest point in Africa than the lowest?
Why should Africa not have been as carefully explored and as thickly settled as North America?
What is an oasis? How is one formed in the midst of desert dryness?
If compelled to live in Africa, what part of the continent would you choose?
Why are not the great rivers of Africa of more value for navigation?
What is a *simoom?*

Outline and Questions on Africa—Continued

What effect do the mountains of Africa have on the temperature? On the rainfall? On the rivers?
What is one of the great dangers that desert caravans have to face?
What cruel custom do some of the tribes have with regard to their aged?
What are the two great divisions of the inhabitants of Africa?
How did Stanley's purpose in going to Africa differ from Livingstone's?
Is Africa chiefly an independent continent, or one governed from without?
What part of the western hemisphere is in the same latitude as the Desert of Sahara?
What are the differences in the conditions of the two places?
What difference has the Suez Canal made to commerce?
What is the largest island near Africa? Is its relation with the mainland very close?
Why do not the lions, elephants and giraffes make their homes in the tropical jungles of Africa?
In what three respects does Africa rank second among the continents?
What proportion of the drainage of Africa finds no outlet to the sea?
What does the Arab of Africa understand by the word *bath?*
What is the chief mountain range of Africa?
Does it contain the highest peak?
For what is Kimberley noted?
What part of the continent produces copper in abundance?
Name three animals that live in Africa and nowhere else in the world.
How does the Congo compare in length with the Mississippi? The Nile with the Amazon?
What part of Africa was known to the world in the time of the Romans?
What explorer first sailed around the Cape of Good Hope?
Who are the Boers?
Compare Victoria Nyanza in size and shape with Lake Superior.
Give some of the main characteristics of the Hottentots.
How does the highest point in Africa compare in altitude with the highest point in South America?
How much larger is Africa than South America? Than Europe?
Would good natural harbors have had any effect on the history of Africa?
What are rift valleys?
Is the southernmost point of Africa as far south as the southernmost point of South America?
How many of the great rivers of Africa discharge into the Atlantic?
What is the longest lake in the world?
How does the southern desert differ from the Sahara?
Name several ways in which the Africans use the baobab tree.
What is a savanna?
What was the object of Roosevelt's expedition to Africa?
What was the popular name for Africa a generation ago? Is it still appropriate?
About how many oases are there in the Desert of Sahara?
Of what use is the date palm to the people of Africa?
From the map, pick out the largest political division of Africa.
What did David Livingstone accomplish for Africa?
When was the Union of South Africa established?
Compare the Bushmen and the Hottentots as to intelligence.
Do all the Arabs live in Arabia?
What harm has the desire for ivory done?
What did the seventeenth-century traders carry off with them when they visited Africa?
How does the African elephant differ from the Asiatic?

American, Henry M. Stanley, was sent by the *New York Herald* and the *London Telegraph* to find him; this explorer's great contribution to the world's knowledge was the course of the Congo. See STANLEY, HENRY M.; LIVINGSTONE, DAVID.

The Partition of Africa. At the time of Stanley's voyage only small portions of the "Dark Continent" were under the flags of Europe. At the south the British had been in possession since 1806, and the Boers had *trekked* to their Orange River Colony and the Transvaal, farther inland. France had taken Algiers in 1830 and put an end to Mediterranean piracy (see BARBARY) and the Portuguese, French and English had sundry small settlements on the west coast. Two influences now acted to stimulate European activity in Africa—the dream of King Leopold I of Belgium to found a vast empire, and the spurring of French and German ambitions by the Franco-German War of 1870.

King Leopold chose the Congo for his efforts, and in 1876 organized the African International Association, the avowed purpose of which was the systematic exploration of equatorial Africa. Stanley was sent back to Africa to carry out the association's plans. But the international character of the undertaking was largely a myth; French and Portuguese agents were also active in the Congo, aiming to forestall the Belgians wherever possible. King Leopold determined to secure definite international acknowledgement of his company. The United States and Germany recognized its flag in 1884, and the next year joined twelve nations of Europe in a treaty which created and neutralized the Congo Free State. In 1908 the Congo was formally declared a Belgian colony, and Leopold's dream became a reality.

The efforts of other nations may be briefly outlined; their relative success is best shown by the map. France's aim has been to link its possessions on the different coasts by a massive inland empire. England, inspired by Cecil Rhodes, has worked for continuous possessions from Cape-to-Cairo. Germany was deprived of all its African possessions in 1919. Portugal has expanded its already existing colonies. Italy has fought for influence over Abyssinia, and recently has raised its flag in Tripoli. Spain has maintained its few small territories and has attempted expansion at its own doorway, in Morocco. For the stories of these varied activities the reader may refer to the articles on the UNION OF SOUTH AFRICA; CAPE-TO-CAIRO RAILWAY; SOUTH AFRICAN WAR; TRANSVAAL COLONY; ORANGE FREE STATE; CONGO; ABYSSINIA; TRIPOLI; ALGIERS; MOROCCO; MADAGASCAR; and each of the nations concerned. See, also, the story of LIBERIA, which, excepting Abyssinia, is the only independent state on the continent. C.H.H.

Consult Keltie's *The Partition of Africa;* Stanley's *Through the Dark Continent,* which, though old, is valued as a book of original sources.

Related Subjects. The following topical index of articles in these volumes relating to Africa will make possible a systematic study of the continent:

CAPES

Agulhas — Good Hope

CITIES AND TOWNS

Abomey, Aboukir, Abydos, Addis Abeba, Alexandria, Algiers, Assuan, Bloemfontein, Boma, Cape Town, Cairo, Carthage, Durban, Fashoda, Fez, Freetown, Heliopolis, Johannesburg, Khartum, Kimberley, Ladysmith, Memphis, Monrovia, Morocco, Oran, Port Elizabeth, Port Said, Pretoria, Saint Paul de Loanda, Siut, Suez, Tangier, Thebes, Timbuktu, Utica

COAST WATERS

Atlantic Ocean, Delagoa Bay, Guinea, Gulf of, Indian Ocean, Mediterranean Sea, Mozambique Channel, Red Sea

LAKES

Albert Edward Nyanza, Albert Nyanza, Chad, Nyassa, Tanganyika, Victoria Nyanza

MOUNTAINS

Atlas, Kilimanjaro

PEOPLES

Bantu, Berber, Bushmen, Capts, Hottentots, Kaffirs, Mandingo, Matabele, Negro Race, Zulus

POLITICAL DIVISIONS

Abyssinia, Algeria, Angola, Ashanti, Barbary States, Basutoland, Cape of Good Hope, Province of the, Congo, Dahomey, Darfur, Egypt, Ethiopia, Fezzan, French Guinea, French Somaliland, Gambia, German East Africa, German Southwest Africa, Gold Coast, Guinea

Ivory Coast
Kamerun
Kordofan
Liberia
Mashonaland
Morocco
Natal
Nigeria
Nubia
Numidia
Orange Free State
Portuguese East Africa
Portuguese Guinea
Rhodesia
Senegal
Senegambia and Niger
Sierra Leone
Sokoto
Somaliland
Sudan
Togoland
Transvaal
Tripoli
Tunis
Uganda
Union of South Africa
Wadai
Zululand

RIVERS

Congo
Gambia
Niger
Nile
Orange
Senegal
Shire
Victoria Falls
Zambezi

CLIMATE CONDITIONS

Kalahari Desert
Sahara
Sirocco

CHARACTERISTIC ANIMALS

Antelope
Buffalo
Camel
Chimpanzee
Crocodile
Elephant
Giraffe
Gnu
Gorilla
Hippopotamus
Hyena
Leopard
Lion
Ostrich
Rhinoceros
Zebra

LEADING PRODUCTS

Diamonds
Gold
Ivory
Rubber

HISTORY

Livingstone, David
Park, Mungo
Roosevelt, Theodore
South African War
Stanley, Henry M.

AFRICAN METHODIST EPISCOPAL CHURCH, a religious organization, formed exclusively for the colored people. It is a branch of the Methodist Episcopal Church and was established in Philadelphia in 1816 by Richard Allen. The African Methodist Episcopal Zion Church was organized four years later. While independent of the mother Church, these two bodies are conducted under the same rules and system of government as the older organization. In 1913 the African Methodist Episcopal Church had 620,000 members, and the Zion Church had 568,608. See METHODISTS.

AGAMEM'NON, one of the outstanding figures in ancient Greek legend, brother of Menelaus, whose wife Helen was the cause of the Trojan War (see TROY). As king of Mycenae and Argos, and thus the most powerful ruler in Greece, Agamemnon was chosen to command all the Greek forces when the struggle commenced. On his return from the war he was killed by his wife Clytemnestra and her lover Aegisthus. See, also, MYTHOLOGY.

AGANIP'PE, in Grecian mythology, a fountain near Mount Helicon, in Boeotia, sacred to the Muses, which had the property of inspiring with poetic fire any person who drank of its waters.

AGASSIZ, *ag' ah se,* LOUIS JOHN RUDOLPH (1807-1873), a great naturalist and teacher, one of those rare men who combined ability for research in science with the power of inspiring other men. Agassiz was the greatest authority of his day on marine zoölogy, and he discovered many new facts in geology and animal life, but his fame is greater for the imagination and the enthusiasm which he communicated to his pupils. His science was sometimes at fault; his humanity never. At the age of 22 he wrote to his father: "I wish it may be said of Louis Agassiz that he was the first naturalist of his time, a good citizen, and beloved of those who knew him." No higher praise can be given him than to say that all of this came true.

LOUIS AGASSIZ

Agassiz was born in Switzerland, in a little village not far from the shores of Lake Neuchâtel. He studied medicine at the universities of Zurich, Heidelberg and Munich, but before his course was completed was invited to assist a well-known naturalist on a study of Brazilian fishes. This work led to extended investigation of European fishes, and the study of fossil fishes in turn stirred his interest in geology. In 1847 he became a professor at Harvard University, where he founded the Museum of Natural History, now world-famous as the Agassiz Museum. Another forward step, due to him, was the summer school on the island of Penikese in Buzzard's Bay, opened in the year of his death. This was the first zoölogical laboratory built amid the haunts of the animals to be studied. Over his grave in Mount Auburn cemetery, Cambridge, is a great boulder, brought from the glacier in Switzerland where he made his first important observation on geology, and the pine trees which shelter it were brought from the little village in which he was born.

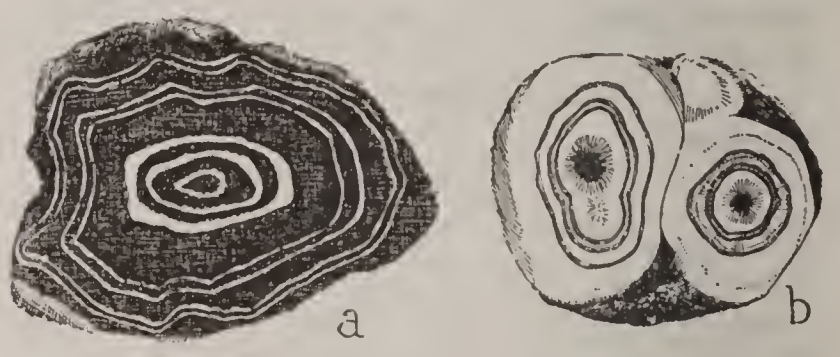
Alexander Agassiz (1835-1910), son of Louis Agassiz, came to the United States from his Swiss home in 1849, two years after his father had accepted an appointment at Harvard University. The son, under the father's guidance, made a special study of zoölogy and geology, and was graduated from Harvard in 1857. Though he was interested chiefly in the animals of the sea, and became one of the world's authorities on fishes, his geological studies were of great value to him after 1866, when he devoted most of his time to the study and development of mines. His investigation and engineering skill turned the Calumet and Hecla mine in Michigan from an unpromising venture to one of the richest mines in the world. Of his wealth, derived from this source, he gave about $1,000,000 to Harvard University to further the work in zoölogy begun there by his father, and contributed generously to other educational and charitable causes. W.F.Z.

AGASSIZ ASSOCIATION, an organization which has been extraordinarily successful in its purpose of interesting young people in nature study. Named in honor of Louis Agassiz, the great nature student and teacher, it has aimed to carry out the conviction he expressed in the words, "The book of Nature is always open, and all that I can do or say shall be to lead young people to study that book, and not to pin their faith to any other." It has therefore placed emphasis on direct observation rather than on reading about natural objects. The association was founded in 1875 by Harlan H. Ballard, and has spread until it has branches in most civilized countries. The membership varies from 12,000 to 15,000. One of its outstanding features is the offer of free correspondence instruction in nature study, and another is the offering of prizes for original research work. Association headquarters are at Sound Beach, Conn. If it is desired to organize a local association, directions may be obtained from there. See Agassiz, Louis.

AG'ATE, a variety of fine-grained quartz, usually classified as chalcedony. It is a little harder than steel, but more brittle, and takes a high polish, and it is therefore in demand for ornaments and jewelry. Agates are variegated in color, with bands of white, gray, brown, yellow, blue or black; or the colors may be so blended as to present a cloudy, moss-like appearance. They are formed in cavities in rocks by layers of silica deposited by water.

Agates are found in Austria and Germany, where their polishing is an important industry, also in India and many parts of the United States and Canada. The principal commercial supply, however, comes from Brazil and Uruguay. Polished agates, which are often put through various processes to heighten the color effects, are used for knife handles, breast pins, watch charms, vases and other ornamental purposes. Chemists use mortars and pestles of agate to crush hard substances, and chemical balances are supported on "knife-edges" of agate, which is not affected by moisture or chemical fumes.

MOSS AGATES



a, cross-section of onyx agate
b, cross-section of bull's-eye agate

AGAVE. See Century Plant.

AGE. In law, *age* is applied to the period of life when men and women are enabled to do legally that which before, for want of years and, presumably, of judgment, they could not do. Full or legal age in male or female is twenty-one years in most countries, though in some states women become of age at 18. The age is completed on the day preceding the anniversary of a person's birth.

The term is also used to designate the successive epochs or stages of civilization in history or mythology. The *Archaeological Ages* or *Periods* are the Stone Age, the Bronze Age and the Iron Age, these names being given in accordance with the materials chiefly employed for weapons and other implements during the particular period. (See Bronze Age; Iron Age; Stone Age.) The word age is also applied to certain historical periods marked by special characteristics, as for instance the *Elizabethan Age,* noted for its literature and art, the *Middle Ages,* and the *Feudal Age,* periods of transition from the barbaric *Dark Ages* to times of enlightenment and culture. More modern still

is the *Victorian Age,* during which great progress was made in art, literature and science, and the tone and morality of social life were greatly elevated.

AGENT, in law, one who is employed to represent another individual, or company, called the *principal,* the relation between them being called *agency.* An agent may be *general* or *special,* the latter acting by authority for his principal in a special business only. The position of agent is one of trust, calling for faithful performance of specified duties. The compensation varies according to the responsibility incurred and the work done. A definite salary may be agreed upon, or the agent may receive a commission figured at a certain per cent of the value of the business resulting from his labor.

The agent is personally liable to third persons when he does not disclose the principal for whom he is acting, but not otherwise, unless he exceed his authority. The employer is not responsible for acts of the agent which are unauthorized. The principal is generally liable to third persons for civil offenses committed by the agent when acting within the scope of his agency; but this does not relieve the agent of personal liability himself. As a means of enforcing payment for his services, the law gives the agent a lien upon the property of the principal which may be in his hands. See CONTRACT; LIEN.

AGINCOURT or **AZINCOURT,** *ah zhan koor',* a village of Northern France, in the department Pas-de Calais, where was fought, in 1415, a famous battle of the Hundred Years' War (which see). In this battle the heavily-armed French, numbering about 60,000, were totally routed by the English archers of Henry V, whose force numbered only 15,000. The French nobility was almost destroyed in this conflict.

AGNOS'TIC, a word of Greek origin, meaning *unknowable.* It refers to a person who believes that no one can really prove that a God exists, or that he does not exist. He takes the position of one who says, "I do not know." The belief of the agnostic is based on the theory that the human mind can offer proof only for the things that are known through the senses; that is, that can be touched, or seen, or heard, etc. Likewise, he argues, man cannot prove many things that seem to be real, not even his own existence. An agnostic is not an atheist, for the latter denies that there is a God. An old school of Greek philosophers called Sophists held the same theory, but the word *agnostic* was first used in 1869 by Thomas H. Huxley. *Agnosticism* is the name given the principles of the agnostics. See SOPHISTS.

AGOUTI, *ah goo' te,* the name of several rodents, or gnawing animals, related to the porcupines. There are eight or nine species, all belonging to South America and the West Indies. The common agouti, or yellow-rumped

AGOUTI

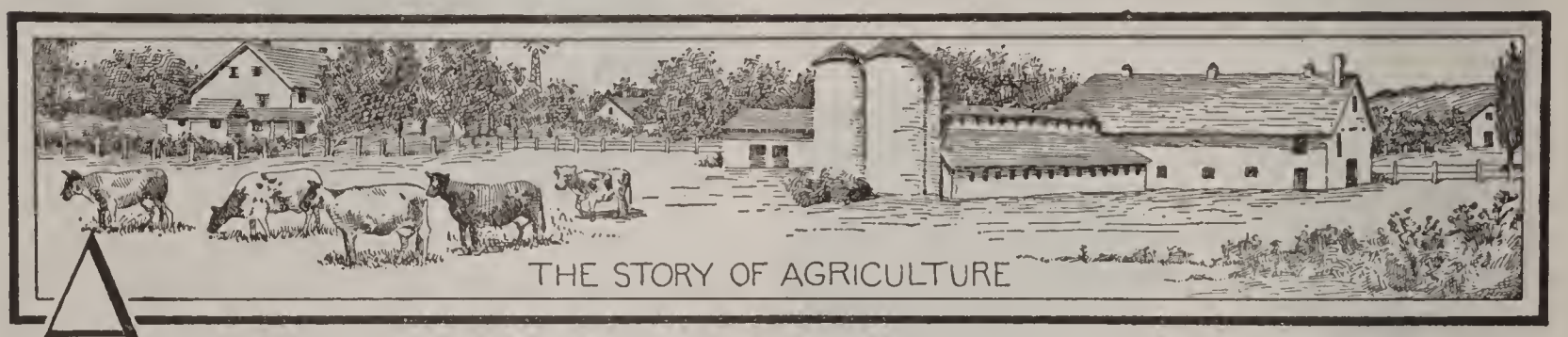
cavy, is of the size of a rabbit. It burrows in the ground or in hollow trees, lives on vegetables and fruit, though eating meat whenever it can be obtained. The agouti grunts like a pig, and is as greedy, so where it is common it does much injury to crops. Its flesh is white and palatable. It is readily domesticated, but is too destructive to make a desirable pet.

AGRA, *ah' gra,* a city of India, in the United Provinces of Agra and Oudh, 841 miles northwest of Calcutta and 110 miles southeast of Delhi. It was the capital of the former province of Agra, and has interesting structures, among which are the imperial palace, the Moti Masjid, or Pearl Mosque; the mosque called the Jama Masjid, or Great Mosque, and the Taj Mahal, a mausoleum, or tomb, of the seventeenth century, built by the emperor Shah Jehan to his favorite queen (see TAJ MAHAL). Agra has an important trade in grain, sugar, tobacco and cotton, and the inhabitants have acquired a worldwide reputation for the manufacture of gold lace and delicate inlaid mosaics.

The city is one of the oldest in India and has been prominent since the first part of the sixteenth century. During the Sepoy Rebellion of 1857 it was a place of refuge for Europeans, being captured by the British after a siege lasting several months. At present Agra is an important railway center and also a commercial and financial center of northwest India. Population in 1921, 185,946.

AGRA'RIAN LAWS. The word *agrarian* is derived from the Latin *ager,* meaning *field,* and was applied to all those laws enacted in Rome for the division of the public lands. Originally the right to the use of public land belonged only to the ruling class, or patricians, but latterly the plebeians, or commoners, were allowed to hold it, though they were often unfairly treated in the sharing of it. Hence arose much discontent among the plebeians, and various remedial laws were passed, some of them giving rise to the fiercest struggles which disturbed the Roman State. Few of the agrarian laws were ever seriously put into execution.

AGRICOLA, *a grik' o la,* GNAEUS JULIUS (37-93), a Roman statesman and general, whose *Life,* by his son-in-law Tacitus, is considered one of the most perfect biographies ever written. As governor of Britain (77-84) Agricola reduced the greater part of the island to subjection, and although he was the twelfth Roman general who had been in the island he was the first who in any degree reconciled the Britons to the Roman yoke. He constructed the chain of forts between the Forth and the Clyde, to afford protection against the barbarians from the north, and sailed around the island, discovering the Orkneys. His character was blameless.



AG'RICULTURE is the art of cultivating the soil to produce material for feeding and clothing the human race. It is the oldest of all occupations. "The first farmer," says Emerson, "was the first man, and all historic nobility rests on possession and use of the land." Agriculture is also the most widely-extended of all occupations, and it lies at the foundation of all other industries. Daniel Webster once said, "When tillage begins, other arts follow. The farmers, therefore, are the founders of civilization." Unless man were fed and clothed the race would perish.

Illustrating Its Importance. Mr. and Mrs. Adams with their children, John, aged 14, and Mary, aged 12, lived in the city. Like many other city children, John and Mary knew but little of the country, and did not seriously consider farming or anything connected with it. Their father and mother, however, had come from the farm, and they decided to help John and Mary to obtain correct ideas of the country and of a life such as they lived in their younger days.

"John, where did this bread come from?" asked Mr. Adams, at dinner.

"Why, mother bought it at the baker's, I suppose."

"Very well, but where did the baker get it?"

"O, I know," said Mary, "he makes it."

"But what is it made of?" continued the father.

"There is flour in it," said John, "and water, and—and—lots of other things."

"A boy never knows anything about cooking; let me tell," said Mary. "Bread is made of flour, water and yeast and—what else do they put in it, mother?"

"I don't see as you know much more about it than I do," said John.

"You children can learn how to make bread some other time," said Mr. Adams; "I want to know where the baker got his flour."

"He bought it of the wholesale grocer," replied John.

"Well, where did the grocer get it?"

"That is about as far as I can go," said John. "I have often wondered where all the things we eat come from, but I have so many things to study in school that I don't have time to read about anything more."

"Well," replied the father, "suppose we make a little study of these things at dinner. Let us begin with the bread. What you and Mary have said is true, but we need to look into the subject a little further, if we would know the real source from which we obtain bread and all other articles of food. The real source of all these is the farm, and were it not for the farmers all the people who live in the city, as we do, would soon be without food."

"Why, I never thought of that before; I never supposed the farmer amounted to much,

THE FARMER FEEDS THEM ALL

Soldier

Carpenter

Sailor

Child

Blacksmith

Lawyer

Doctor and Nurse

Tradesman

Writer

Miner

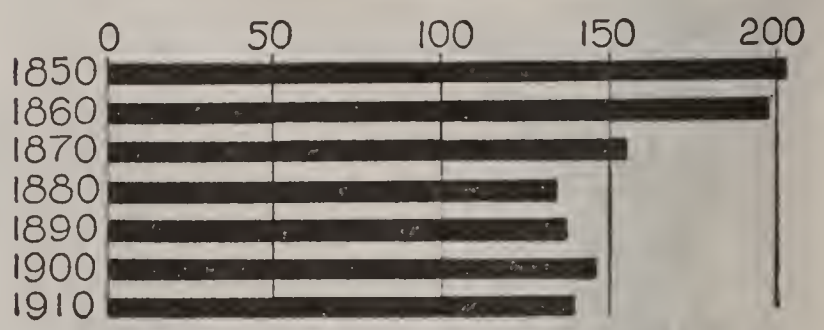
anyway," said John. Mary expressed a similar idea, and both asked their father to tell them about those common articles of food which we all eat without giving a thought to the source from which they come, or the labor required to prepare them for our use.

During the next few days Mr. Adams took the children on a number of imaginary journeys. With him they visited in fancy the great wheat fields of the Dakotas and Canada, the corn belt in Illinois and Iowa, the cattle ranches of Texas and Montana, the fruit orchards of the Pacific states, the dairy farms and creameries of Wisconsin, the sugar plantations of Louisiana, the beet farms of Michigan and Colorado and the poultry farms near some of our great cities. Then he took them to far-off lands—to the coffee plantations of Brazil, the tea gardens of Formosa, the rice plantations of China and the spice groves of India.

Before these imaginary excursions were ended John and Mary learned that everything they ate, except salt, came from a farm in some part of the world and that agriculture was carried on in every country. But Mr. Adams did not stop here. In the same delightful way he led the children to the study of cotton, flax, wool and silk, so that they were convinced that we depend upon the farm for what we wear as well as for what we eat. In their minds the farmer at once became a very important individual.

Progress of Agriculture. Agriculture began when the first man selected plants for his food. His next step was to scratch the ground with a stick and plant seed. Then he took a forked stick and made a plow with it. Two or more men hauled this plow while another held it in position. But this labor was too hard, so man tamed the ox and the ass and made them do the hauling and the carrying of his burdens, as well. From these simple beginnings, agriculture has advanced through the centuries until to-day traction engines haul over our great wheat fields gang plows that turn more than fifty furrows at a time. Later these same engines haul over the fields of ripened grain a machine which at one operation harvests, thrashes and sacks the grain ready for market—does everything, one humorist says, except to cash the check for the crop.

Such has been the progress in agriculture since the middle of the last century that the labor of producing a bushel of wheat with the most modern appliances has been reduced from a little over three hours to about ten minutes, and the cost from 17¾ cents to 3½ cents. Formerly it required four and one-half hours' labor to produce a bushel of corn; now



DECREASING SIZE OF FARMS

Average size, in acres, in the United States, from 1850 to 1910.

it requires less than forty minutes. Then, it cost 35¾ cents to produce the bushel; now it costs less than ten cents. Then, it took thirty-five and one-half hours' labor to grow a ton of hay, at a cost of $3.06; now, it takes eleven hours and thirty-four minutes at a cost of $1.29. But this is not all. Production has been increased many fold; new and better varieties of grains, vegetables, fruits and live stock are being constantly produced; the use of agricultural machinery has enabled the farmer to give more attention to the business side of his affairs, and the best farms are now operated on a systematic plan which includes both the fields and the home.

Causes of Progress. While the progress of agriculture may seem to have been slow, it has advanced about as rapidly as other arts. The more rapid advance of recent times is due chiefly to the following causes:

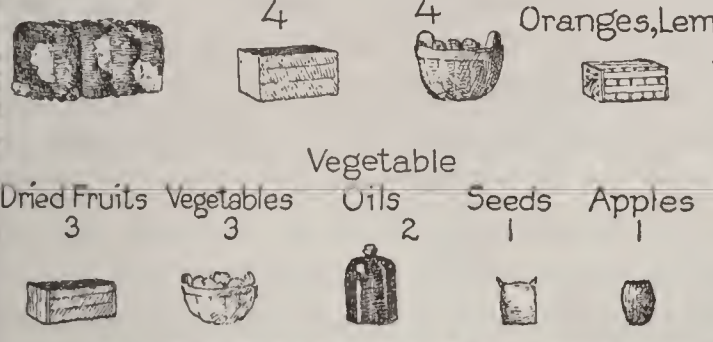
Transportation. It is of no advantage to the farmer to raise crops that he cannot market, therefore good roads form one of the most essential conditions to his success. Of these the country has far too few, but railways have become so numerous that most farms are now within a few miles of a station if not directly on the railway itself. Increased facilities for marketing his crop have greatly increased the farmers' production.

Machinery. The machines which have done most towards the progress of agriculture are the harvester, or reaping machine, the gang plow, the seeder and the horse hoe. What these have accomplished in reducing the cost of production is told in the preceding paragraph. Without these inventions cultivation of the large farms in the Prairie states and the Canadian provinces of the Northwest would be impossible. Many other machines have also contributed their share. Among these are the steam thrasher, the traction engine, the gaso-

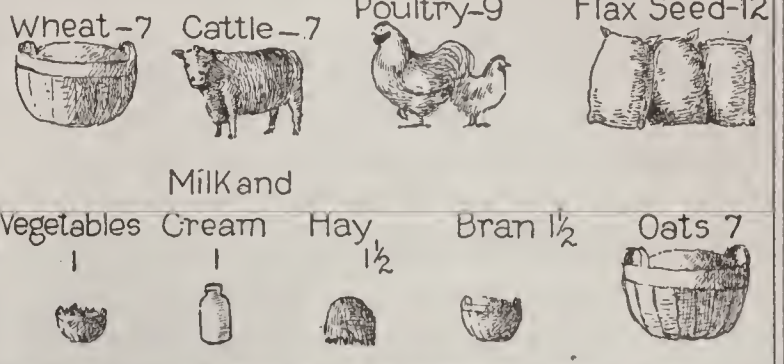
THE FARMER AND THE NATION

WHAT AMERICAN FARMERS SEND TO CANADA

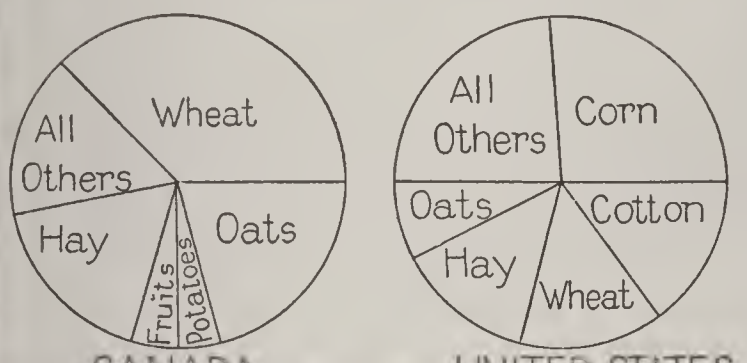
Figures Represent a Year's Exports In Millions of Dollars



WHAT CANADIAN FARMERS SEND TO UNITED STATES



THE SHARE OF EACH CROP IN TOTAL CROP VALUE



ROOM FOR IMPROVEMENT

Figures Represent Bushels per Acre

WHEAT		CORN	
Denmark	47	Canada	58
Canada	21	New Zealand	48
United States	15	United States	26
OATS		**POTATOES**	
Belgium	72	Belgium	306
Canada	39	Canada	160
United States	32	United States	98

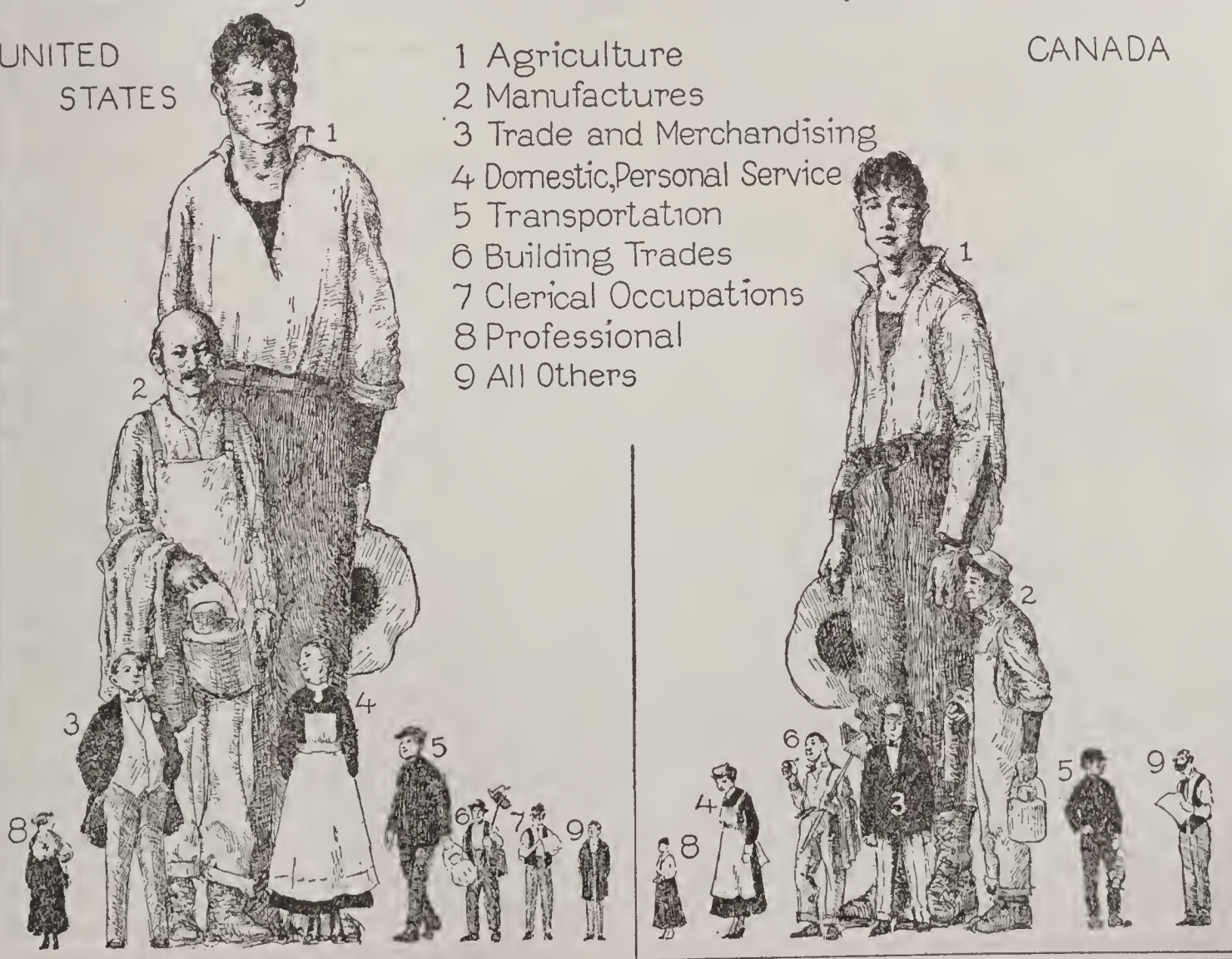
ALL SORTS OF WORKERS

In each country the relative numbers are shown by proportion of heights

UNITED STATES

CANADA

1 Agriculture
2 Manufactures
3 Trade and Merchandising
4 Domestic, Personal Service
5 Transportation
6 Building Trades
7 Clerical Occupations
8 Professional
9 All Others



line engine and the cream separator. Moreover, we must not forget the improvement in the simpler farm implements such as the hoe, the spade, the rake, and the ax, which, by being made lighter and of better material than in the long-ago, have enabled those using them to do more work with less expenditure of strength.

Chemistry. The application of chemistry to soils, plants and fertilizers lies at the foundation of scientific agriculture. The farmer can now learn from the nearest agricultural experiment station what fertilizer is best suited to his soil and what crops he can grow with greatest success. Agricultural chemistry is now applied to the study of soils, of plant food and of fertilizers wherever there is an agricultural college.

Education. Not many years ago the average farmer was proud to express his contempt for what he styled "book farming." Happily, that day is past, and agricultural education (see subheading, below) now occupies an important position in the educational systems of all civilized countries. In the United States and Canada the demand for graduates from agricultural colleges and high schools is greater than these institutions are able to supply. Furthermore, the outlook for supervisors and teachers of agriculture is so promising that young men from the city constitute no inconsiderable portion of the student body of these institutions. This is the beginning of a right sort of movement from the city to the country, and it is increasing.

Scientific Agriculture. All the foregoing movements have combined to make agriculture a science as well as an art. The influence of the agricultural colleges and experiment stations extends to the remotest regions, and everywhere the trained scientist is helping the farmer to solve his problems and to make his farm more profitable. No longer can the old hit or miss methods maintain themselves in competition with the scientific methods of the "new agriculture," which in the near future will not only render productive vast areas still barren, but also reclaim the so-called "worn-out farms" and repopulate with prosperous families those which have been abandoned.

Prevention of Disease. The application of scientific methods to the study of those diseases of plants and animals which are ever robbing the farmer of his profits constitutes one of the most important contributions of science to agriculture and is saving annually millions of dollars to the farmers. While not all of these diseases are conquered, many of them have been; the ravages of others have been checked, and new victories are gained each year. See DISEASE.

Insect Pests. What has been said about the study of disease applies with equal force to the study of destructive insects. These pests also deprive the farmer of a portion of his income every season, and, now and then, they destroy his crop altogether. Through the discoveries made by the Department of Agriculture at Washington and in Canada by the same department of government, and at the various experiment stations, we now are able to deal successfully with these pests on the American continent.

Branches. Agriculture is so widely extended over the earth and so varied in its industries that it is naturally divided into a number of branches. While many farmers are interested in several of these branches, each gives special attention to one or two. The farmer in the corn belt, for instance, makes corn the chief product of his land, but he must give enough attention to growing other crops and to dairying to produce sufficient food for his family and live stock, unless he would purchase this food at an expense considerably greater than would be required to raise it. Likewise, the dairy husbandman must raise most of the feed for his herd, if he would carry on his business with profit.

The following are the chief branches of agriculture in America:

Raising Cereals. In some regions the soil and climate are especially suited to raising cereals. For instance, Canada, Minnesota and North Dakota are adapted to raising spring wheat, and this constitutes their chief crop. On the other hand, Kansas is especially suited to raising winter wheat. Illinois and Iowa are the great corn states, because of the particular adaptation of the soil and climate of the corn belt to the production of this cereal. The growing of cereals is more widely extended than any other branch of agriculture. Each of these crops is described under its title in these volumes.

Other Crops. In some of the Northern states having a cool climate and in Southern Canada, flax is extensively grown on new soil. Potatoes are also successful in these regions. Oats is an extensive crop throughout the northern half of the United States and in most of the Canadian provinces. In Texas, Georgia, South

THE OLD AND THE NEW. In the wheat harvest the farmer with four horses can do half as much work as his neighbor with one tractor.

Carolina and a number of the other Southern states cotton constitutes the chief source of revenue (see COTTON). Fodder crops, including corn for ensilage, clover, timothy and alfalfa, are also of great importance in those localities where live stock is raised or dairying is the chief line of agricultural industry.

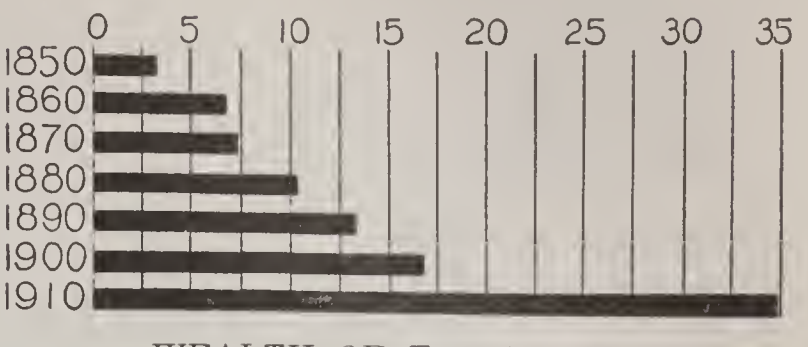
Horticulture. Horticulture is that branch of agriculture which includes the raising of flowers, garden vegetables and fruits. The growing of vegetables and other garden produce for market is usually called *truck farming,* and this branch of horticulture is very common near large cities and in those localities where soil and climate admit of raising two or more crops a year. The raising of fruit is probably the most extensive branch of horticulture, particularly in those regions which depend upon irrigation for their supply of water. All forms of horticulture are intensified farming—that is, the thorough cultivation of small tracts of land that is highly fertilized.

Live Stock. Some localities are especially adapted to raising live stock. Iowa and Illinois, for instance, raise large numbers of hogs, which are fattened on corn. Iowa also raises beef cattle. Kentucky is noted for its fine horses; Montana, Wyoming and several other states contain extensive grazing lands where thousands of sheep find pasturage, and in Texas beef cattle are raised in large numbers. See CATTLE; HOGS; HORSES; SHEEP.

Dairy Husbandry. Sections of the country having a cool climate, an abundance of pure water and soil adapted to growing alfalfa and other ensilage crops are suited to dairying, and this branch of agriculture is of great importance in those states. See DAIRYING; BUTTER; CHEESE; COW; MILK.

Poultry. The proceeds from the poultry raised in the United States exceed those received from the wheat crop; strange as this statement may seem, the hen is a mighty asset. Some poultry is found on nearly every farm, but there are numerous small farms which are devoted entirely to raising chickens, and when rightly managed, they prove a profitable investment. While poultry raising is a branch of agriculture, it is so nearly a distinct industry that the reader is referred to the article POULTRY for a detailed account of it.

The Outlook. *Increase in Value of Land.* Between 1900 and 1910 the value of United States farm lands more than doubled, the exact increase being 117.4 per cent. The chief cause of this rapid rise in value was the withdrawal of all free government lands from settlement on the old basis. Another cause



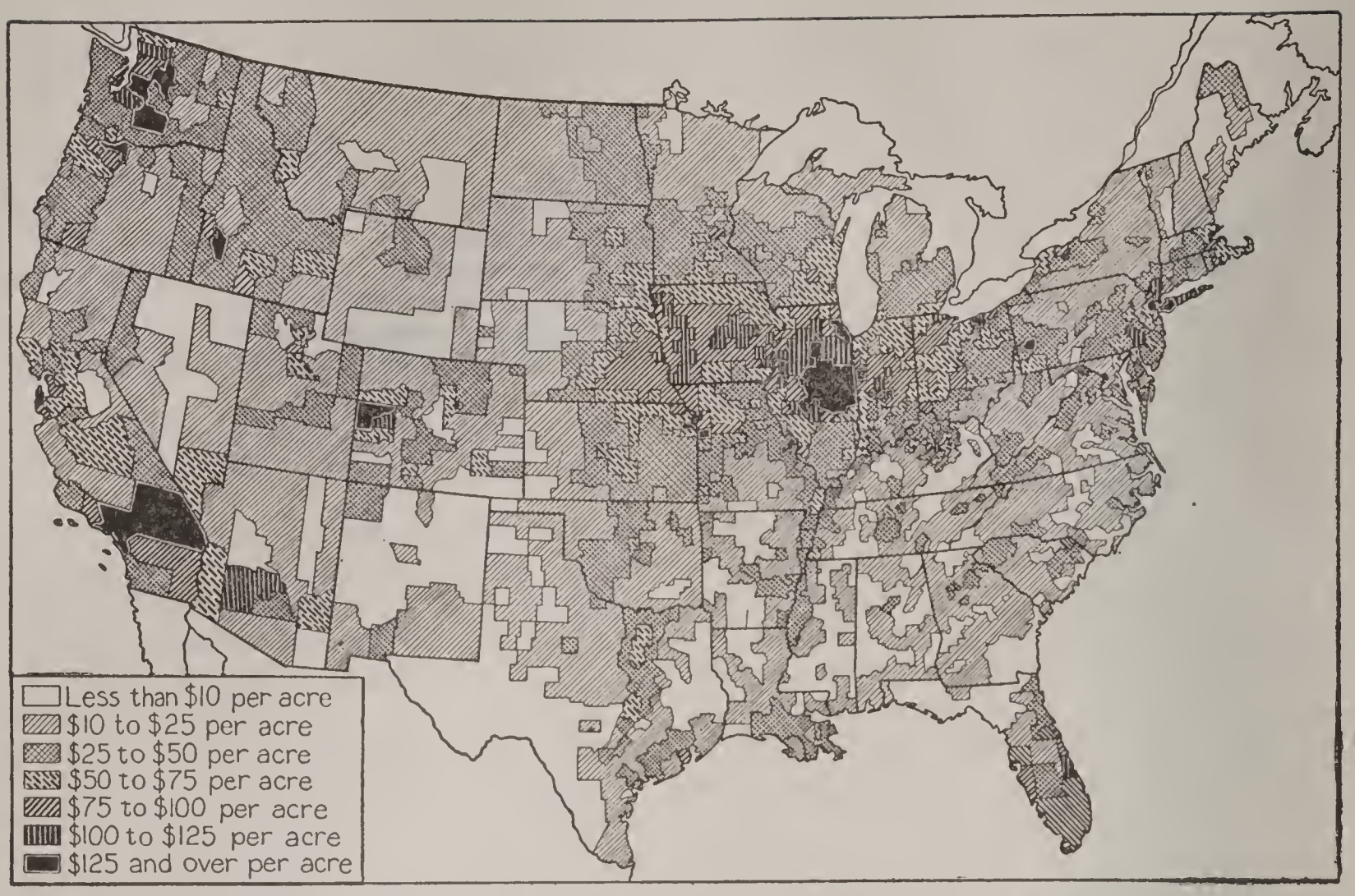
WEALTH OF THE FARMS

Value of farm lands and buildings, in billions of dollars, in the United States, from 1850 to 1910.

was the increased production per acre, due to better methods of tillage, a more thorough knowledge of fertilizers and more careful selection of seed. This increase in value of the land has been an advantage to the farmer, and has also led men and women from the city to invest in and occupy farms. Since there is no more free land, and since the population of the country is constantly increasing, the value of land is destined to increase from year to year. Canada farm lands between 1901 and 1911 increased nearly 140 per cent in value.

Demand for Farm Products. The demand for food products is constantly on the increase, and, notwithstanding the increase in the production of corn, wheat, oats, and numerous other crops, the price of these commodities has advanced from year to year. The United States and Canada feed not only their own population, but the peoples of other countries as well. Present facilities in transportation enable fruits, vegetables and fresh meat to arrive in European cities in as good condition as when they leave American ports. These products, as well as flour, wheat and other grains, now constitute an important part of agricultural exports. These conditions assure the farmer a good income, and are likewise a guaranty against over-production.

Assistance from the Government. Every farmer in the United States may receive valuable information and aid from the Department of Agriculture at Washington free of charge, and the Canadian farmer may have the same service from the Department of Agriculture at Ottawa. His state agricultural college and state experiment station are also at his disposal. They will analyze his soil, help him to combat diseases of plants and domestic animals, and to exterminate insect pests. The agricultural colleges are constantly studying to improve the condition of the farmers, and the Departments at Washington and Ottawa



AVERAGE VALUE OF FARM LANDS PER ACRE IN THE UNITED STATES

carry on many lines of investigation over the entire country. Moreover, these great institutions do not limit their work to the farmer; every farmer's wife and every boy and girl on the farms are receiving their careful attention. No other industry receives so much help from the state, provincial and national governments as does agriculture. See subtitles *Agricultural Experiment Stations and Farms* and *Department of Agriculture,* below. See, also, Boys' and Girls' Clubs.

Field for Investigation. More than a generation ago a wise philosopher said: "By and by it will be generally realized that few men live, or have lived, who could not find scope for all their intellect on a two hundred-acre farm." Already this prophecy has become true. The application of chemistry to soils and fertilizers; the improvement of strains of live stock; the production of new varieties of grains, grasses, fruits and other farm plants; the extermination of diseases of plants and animals and of insect pests, and to such an adaptation of his farm to the market as will enable him to receive the greatest remuneration for his labor and investment, all give the up-to-date farmer ample opportunity for the use of a broad education and the employment of every power of a keen and well-trained mind. Modern farming is not drudgery; it is the application of a trained mind to an interesting occupation.

Country Life. *General Conditions.* The general conditions governing life in the country have been far less attractive to many young men and women who have grown up on the farm than those conditions which govern life in the city. Therefore many boys and girls have left the farm for the city, where a great majority of them have continued to live under far worse conditions than those from which they fled.

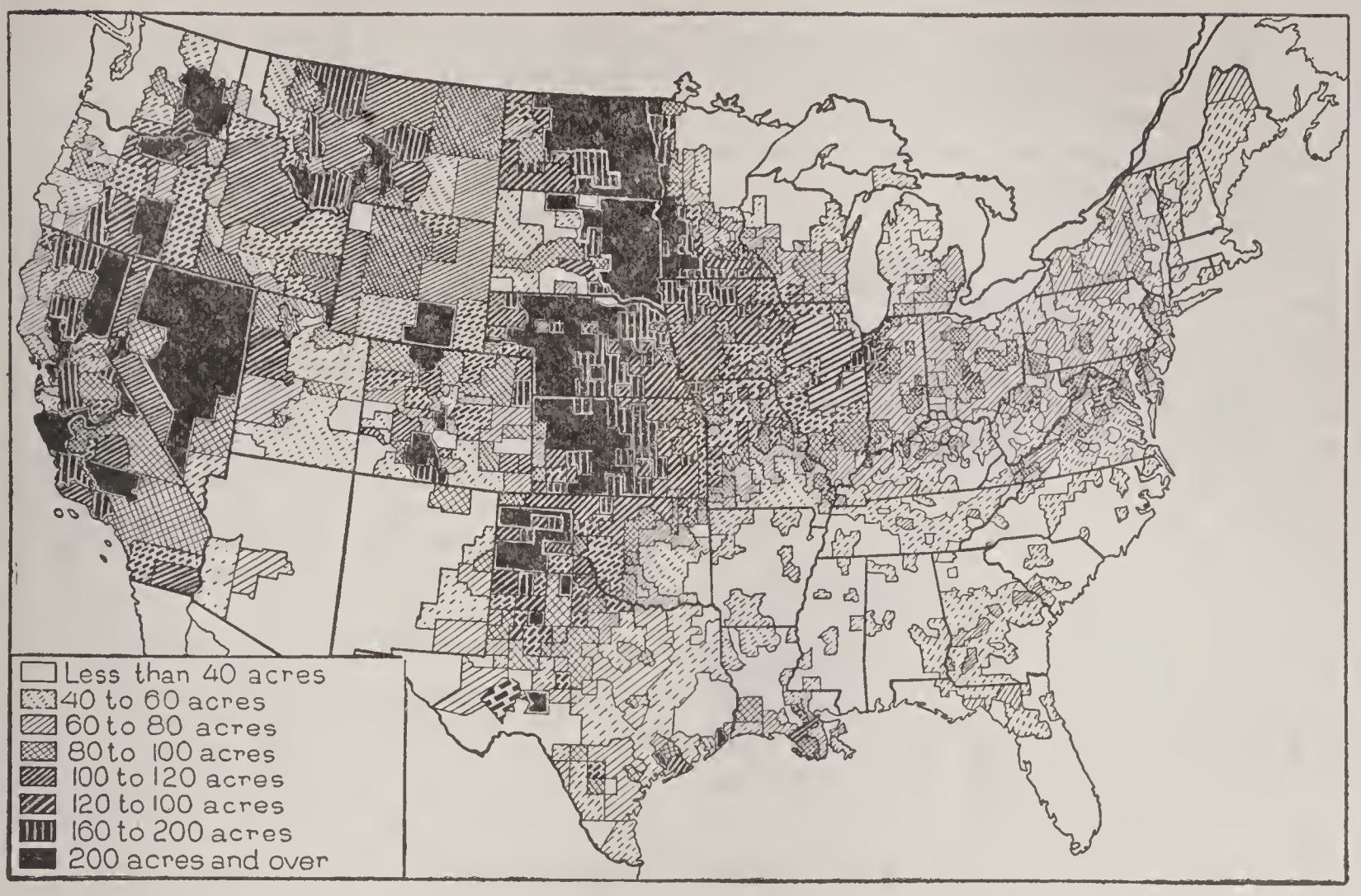
The following causes for leaving the farm are summarized from a lecture by Dr. Liberty H. Bailey, who is an eminent authority on the subject. They are:

1. Lack of business opportunity at home. The father runs the farm, and will not give the boy a share in the business.

2. Education has given the youth a broader outlook on life, and the old farm does not seem to furnish sufficient opportunity for his activities.

3. Lack of congenial associates. The educated young man and young woman like to have for associates those whose outlook on life is as broad as theirs. The new things and great movements in government and society do not interest other members of the family or the young people of the neighborhood unless they have been educated.

4. The boy thinks he sees greater opportunities for success in the city.



AVERAGE ACREAGE OF IMPROVED LAND IN EACH FARM IN THE UNITED STATES

5. There is less financial risk in working on a salary than in running a farm, and there may be more ready money in other businesses.

6. Both the boy and the girl expect to find more diversion and entertainment in the city.

7. The trend of the education of both the boy and the girl has been away from the farm.

These conditions are being rapidly overcome by the following agencies:

Communication. The telephone and the automobile, both of which are now considered to be necessities in many farming communities, are doing much towards overcoming the old conditions and ways of country life. With the automobile the city twenty miles distant is nearer in point of time than the town five miles away without it, and the telephone brings the city and all his neighbors almost in reality to the farmer's door.

With the automobile has come a country-wide demand for better roads, and both nationally and locally there is response to this demand. Concrete and macadamized roads are being rapidly extended throughout the country. Numerous electric railway systems have also joined country towns to each other and to cities. Farmers may now receive daily papers from the great cities, left at their doors by rural free delivery; the great stores of cities can supply their more important needs through parcel post. If families in the country now lead isolated lives it is largely their own fault, for means of transportation are such that all families of a community are able to visit each other at their pleasure.

Education. Formerly the teaching of the schools, with scarcely an exception, led away from the farm. Now, in addition to agricultural colleges and high schools, the public schools are required by law to place agriculture in their courses of study, and some communities employ teachers skilled in agriculture, who, during the summer vacation, go from farm to farm and give instruction in the practical application of the principles taught in the schoolroom.

Agricultural periodicals of a high order, with departments suited to the various members of the family, are so inexpensive that one or more are easily within the means of every farm home. This is equally true of journals on household economics, which are as helpful to the housewife as the agricultural journal is to the farmer.

Several states and provinces have a system of traveling libraries, by which every rural community is supplied with good reading throughout the year. The boys and girls of the country now have excellent opportunities for education.

The Community Center. In many locali-

ties adjoining school districts have combined and formed the "consolidated" school (see SCHOOLS, COMMON). Schools of this type are as thoroughly graded as those in the smaller cities. The consolidated school is of the greatest value to the community. As an educational institution it is a great advance over the one-room schools it has supplanted. But in addition to this it binds together the interests of the community which it serves. The school house is the meeting place for numerous activities such as social gatherings, literary societies, lectures and other entertainments by home or outside talent. The community gains a social atmosphere which it did not possess before, and the long-felt want for these things among the young people is here supplied.

Advantages. The foregoing discussion leads to two conclusions—there is no more desirable place in which to live than the country, and there is no more desirable occupation than that of agriculture. The inhabitants of rural communities may have as much pleasure as those of the city. Agriculture is as remunerative and as free from uncertainties as any other line of business and, as a class, the farmers are the most self-reliant and independent men of the nation. To the young man and the young woman the farm should offer special inducements in its opportunities for the development of the highest type of character. Says an eminent authority:

> The farm offers opportunity to develop a more decent and desirable condition of life—a place where one can develop a physical, social and moral life superior to that which is possible to the great majority of the people who dwell in the city.

A poet also uttered a truthful statement:

> Of all pursuits by man invented
> The farmer is the best contented;
> His profit sure, his calling high,
> And on his labors all rely. W.F.R.

Agricultural Education

The foundation of agriculture on a scientific basis and its elevation to the rank of a profession is distinctly the work of the last half of the nineteenth century. There was a time, no more than a generation or two ago, when the average farmer looked with contempt on what he called "book farming." Who, he asked, could tell him more about his farm than he himself knew? He ploughed and harrowed, planted and harvested as he had always done, and as his ancestors had done before him. Most of his working principles were the outcome of his own experience or of the tradition of the neighborhood. When chemists and biologists first began to explain to him how he could improve his methods, they got little thanks for their offered help. It was not long, however, before farmers began to see the value of the facts which scientists were slowly establishing, and then came the development of a system by which the individual farmer might learn to use the knowledge which others had gained for him.

To-day the education of boys and girls for life on the farms reaches from the common school to college. It goes beyond: it reaches older people whose school days were gone before the dawn of the new era, and it continues to affect those who have had the training for farm life and are actually engaged in agriculture. It gives them not merely the facts which help them to raise crops, but it goes farther, and in the words of Liberty H. Bailey, it is "the expression of a rapidly crystallizing desire to make rural life all that it is capable of becoming and to understand and to realize in the best way all the natural products of the earth."

The modern system of agricultural education naturally falls into three divisions: (1) instruction in colleges and universities; (2) instruction in secondary schools; (3) instruction in common or primary schools. Each of these divisions has had a gradual development, and each has shown from time to time, and shows to-day, a wide variety in the methods of individual institutions. Each, therefore, will be considered in detail.

Institutions of Collegiate Rank. It is a remarkable fact that the first systematic instruction in agriculture was begun by institutions which stood at the top of the educational scale. The "chemistry of agriculture" was announced in 1751 as a study in a model course for colleges, prepared by one William Smith. His plan was adopted in the Philadelphia Academy, out of which grew the University of Pennsylvania. The original prospectus of King's College (now Columbia University), dated May 31, 1754, mentioned animal husbandry, and in 1792 a professorship of botany and agriculture was established there. At that time there was a general public interest in agriculture. The organization of agricultural

EXPERIMENTS POINT THE WAY

ADDING WEIGHT TO HOGS

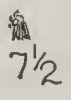
Cornmeal alone | With alfalfa | With meat meal and shorts

AN ACRE FOR COW FEED

Soy Beans 20 bushels | Cow Peas 13 bushels | Corn 26 bushels

BEFORE 15 YEARS AFTER — THE GAIN THROUGH CATTLE

Raising and selling corn
Insufficient fertilizer



7½

20

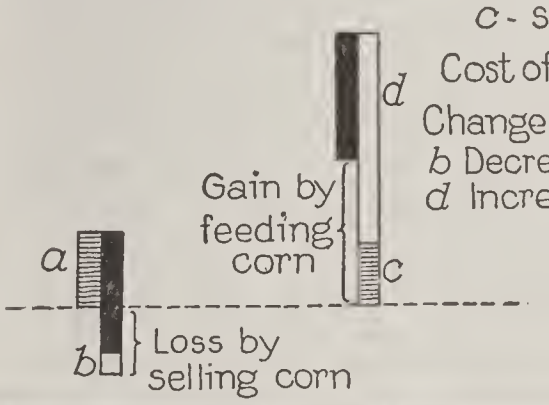
Raising corn, feeding stock, manuring

80

Figures represent bushels per acre

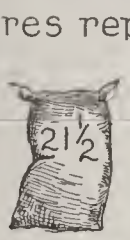
The result in dollars and cents

Income
a - selling corn
c - selling cattle
Cost of farming
Change in land value
b Decreased fertility
d Increased fertility

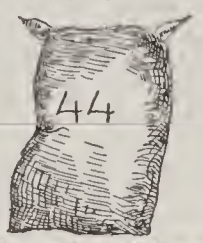


CROP ROTATION PAYS

Figures represent bushels per acre



3rd. year of wheat



Wheat after oats and corn

WHAT FERTILIZER CAN DO

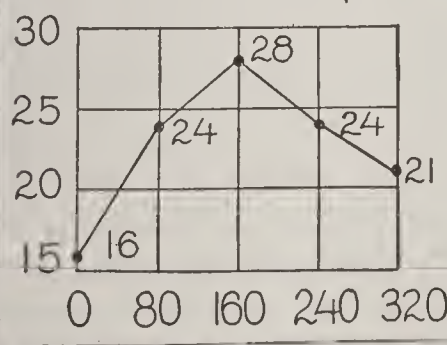
A Tennessee test (corn)

Figures represent bushels per acre

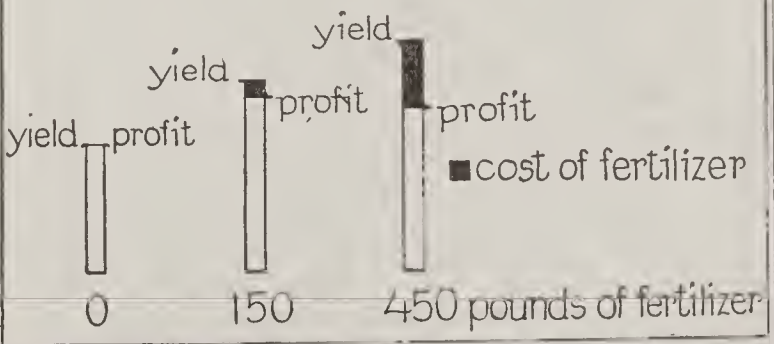
No fertilizer | Manure | Phosphates Potash and Cotton seed meal. | Same plus Quicklime

TOO MUCH FERTILIZER HARMFUL

Bushels of corn per acre



HEAVY YIELDS NOT ALWAYS MOST PROFITABLE



PLOW DEEP

35

Plowed 7 inches

21½

Plowed 3 inches

PLOW AT THE RIGHT TIME

Two experiments in Kansas

July 15 | August 15 | September 15

Figures represent bushels per acre

societies was followed by the foundation of professorships and schools of agriculture. Through the efforts of the Massachusetts Agricultural Society a professorship of natural history was established at Harvard College in 1804, and during the next half century numerous schools of agriculture flourished for brief periods.

In the United States when agitation for agricultural education came to an end at the outbreak of the War of Secession, one state at least, Michigan, was more fortunate. During the height of the agitation, in 1850, the state adopted a constitution in which some far-sighted person had procured the insertion of a clause making it obligatory for the state to maintain a school of agriculture either independently or in connection with the state university. In accordance with this provision the state agricultural college was opened in 1857; it is the oldest institution of its kind now in existence in the United States. In 1859 Pennsylvania and Maryland established similar colleges, now still flourishing.

Land-Grant Colleges. Instruction in agriculture, however, was first put on a firm scientific footing in 1862, by the passage of the Morrill Act. It granted to each state 30,000 acres of public lands for each member it had in Congress, the entire proceeds of the sale of this land to be set aside as a perpetual fund for the benefit of colleges of agriculture and mechanic arts. It is estimated that the endowment thus established has reached a total of over $20,000,000.

At first the "land-grant colleges," as they were called, had a hard struggle. They received recognition neither from the farmer nor from other colleges and universities. Gradually the value of the work done by them became apparent, and a second Morrill Act of 1890 and several later laws provided considerable increases in the annual appropriations. In 1916 each of the colleges received not merely the income from the original land-grant, but also the annual Federal grant of $50,000 for instruction and $30,000 for agricultural experiment stations (see below), in addition to large appropriations from the states. Porto Rico, Hawaii and each of the states has established at least one agricultural college, and seventeen of the Southern states have two, one for white students and one for negroes.

If the special colleges for negroes are excluded, the state agricultural colleges may be divided into two groups—first, the independent institutions; second, those which are departments or schools of state universities. Each group included twenty-five institutions in 1916. Unique among them all is the Massachusetts Agricultural College, which is an independent school offering instruction only in agricultural subjects. Twenty-four independent colleges offer courses in the mechanic arts, including engineering, as well as in agriculture, and twenty-five others are parts of state universities. In all of these colleges the regular course requires four years and leads to a bachelor's degree. Three-fourths of the colleges require the equivalent of a four-years' high school course for admission, but few of them agree in the requirements for graduation. Taking the colleges as a whole, the average course requires about one-fourth to one-third of the time in purely agricultural subjects, the remainder being divided chiefly among English, modern foreign languages, mathematics, social sciences and natural sciences. Many of the graduates become teachers in agriculture in secondary or elementary schools. In addition to the instruction given by the state institutions, several privately-endowed schools offer courses in agriculture, notably Syracuse and Harvard.

Canadian Agricultural Colleges. As Canada is one of the leading agricultural countries of the world it is natural that agricultural education should receive careful attention. Each province has its agricultural college or supplies some instruction in agriculture through the provincial university. The oldest and probably best known of these institutions is the Ontario Agricultural College at Guelph. It has students from every province of the Dominion, from Argentina, Belgium, England, Ireland, India, Japan, Mexico and other foreign countries. In Quebec, Macdonald College, affiliated with McGill University, has a school of agriculture, and in Nova Scotia the agricultural college at Truro provides a complete four-years' course. The Manitoba Agricultural College, in addition to its regular agricultural course for young men, offers a course in home economics for young women. The Saskatchewan Agricultural College at Saskatoon was opened in 1912. In Prince Edward Island the Prince of Wales College offers agricultural courses, as does the University of Alberta at Edmonton, and in New Brunswick there are two agricultural institutes. Much of the instruction in these institutions is to prepare men and women to become teachers.

The Short Course. The early attempts to teach agriculture in colleges failed largely because they were based on the theory that technical study in agriculture should follow the related studies, and because admission conditions were placed so high that most young men who desired to fit themselves for an agricultural career were eliminated. The few who entered the courses, moreover, lost much of their interest before they were allowed to begin their technical studies. To overcome these objections the University of Wisconsin adopted a plan, which has been widely followed both in Canada and the United States, of giving a short technical course, usually for ten or twelve weeks in the winter. There are no requirements for admission and no credit is given for study done; the knowledge gained is the only attraction. These short courses have been exceedingly popular, and have given opportunities for advancement to many men who could not devote three or four college years to study.

In Secondary Schools. It was not until thirty years after the establishment of the first agricultural colleges that the first successful agricultural high school was established. This was in 1888, in connection with the University of Minnesota. Though its success was immediate, by 1898 there were only ten secondary schools giving agricultural instruction. Since that date, however, there has been a great expansion, and in 1916 three-fourths of the state agricultural colleges had agricultural high schools in connection with them. The land-grant colleges for negroes in the Southern states, moreover, though organized as colleges, are yet hardly more than secondary schools. Agricultural courses are also offered in many state and county normal schools, but the object of this instruction is to prepare teachers for elementary schools rather than to make successful farmers.

The independent agricultural high schools are of two classes, either district or county schools. Alabama, which was the first to establish district high schools, now has one for each Congressional district. Georgia, Virginia and Minnesota are other states which have adopted the district system. Wisconsin, on the other hand, was the first to adopt the county plan, by which the state aids the agricultural high school established by any county. This system has also been adopted in Michigan, Maryland and Mississippi, but the experience of these states seems to indicate that in most states the county is too small a unit to bear the expense of a good high school in which only agriculture is taught. The natural compromise is to teach agriculture in the regular high schools, and this plan has been tried in practically all the remaining states. In Missouri alone over 200 high schools are giving some instruction in agriculture. In Canada, instruction in agriculture in many high schools and collegiate institutes, particularly in Ontario, is a part of the regular work. Agriculture teachers for the elementary schools are trained at the agricultural colleges, provincial normal schools, or at special summer sessions of the provincial universities.

It is noteworthy that everywhere, both in the United States and Canada, the use of land for instructional purposes is increasing. Nearly all schools require some actual farm practice in connection with the school work, and many of the schools operate their own demonstration farms. Another feature is the increased use of the home-project method, in which the student is required to do a certain amount of practical farming at home. This work is inspected and is credited to him in addition to his school work.

In Elementary Schools. Instruction in agriculture in elementary schools is distinctly a development of the twentieth century. A compulsory system has been employed in France since 1879, and in its revised national form since 1896, and in Germany, Switzerland, Sweden and other European countries similar systems have been in force since about 1900. In the United States and Canada almost nothing was done previous to 1900, but since then development has been rapid. Many states, as Iowa, require instruction in agriculture in all rural elementary schools. Indiana requires it in all rural schools, both high and elementary. In Ontario the system is optional. There seems to be a general agreement that instruction in elementary schools should emphasize the pupil rather than the subject, that is, the child's eyes should be opened to the vegetable and animal life about him, and the child should be made to feel his relation to this environment. Up to the sixth year of school this work is usually a form of generalized nature study, but thereafter it is directed towards more purely agricultural topics. In the elementary schools, as in the high schools, the tendency is away from text-books towards school gardens, home gardens and other activities. It has been said that no other new movement looking to the vital-

izing of the work of instruction in the elementary school has ever met so ready a response on the part of the people. There is every reason to believe that agricultural instruction will become a regular feature in rural and small town schools in all agricultural sections. An important accompaniment of this movement has been the organization of agricultural clubs for boys and girls, and the interest which these clubs have aroused among the farmers themselves in all sections of the country (see Boys' and Girls' Clubs). W.F.Z.

Agricultural Experiment Stations or Farms

There would appear to be little excuse for owner or tenant on a farm of average fertility to be a poor farmer. Ignorance of correct agricultural methods prevailed widely until about the year 1860; but the country was new, both in the United States and Canada, land was plentiful, and its richness for crop production had in no sense been exhausted. The need for scientific farming had not developed, and probably would in any event have received scant consideration at a time when foundations were being laid, when expansion was a dominant idea and men struggled to gain secure foothold in a wilderness. The farmer knew of agriculture only what he learned from experience or from his neighbors.

The agriculturist knew why the "back forty" acres would grow wheat, but possibly he was puzzled to know why certain other crops on the same land were less successful. He found that the same crop for several years in succession exhausted the soil, but nobody told him how to feed the soil to continue its productiveness or how to manage crop rotation.

In the United States. In 1837 an Englishman named Lawes began experiments on his Rothamsted estate to learn the effect of bone superphosphate on soils. That was the beginning of the story of fertilizers, as we know them. The first experiments were so successful that they were broadened, and to-day the Rothamsted experimental station is accounted the greatest in the world. The Rothamsted idea reached America, and in the United States, between 1858 and 1862, experiments were conducted in Pennsylvania, Michigan and Maryland. The first agricultural experiment station regularly organized in America was in connection with Wesleyan University, Middletown, Conn., in 1875. It was supported partly by gifts of money and by small state appropriations. The record of growth in number of stations from this modest beginning, when less than $4,000 per year was available, to present proportions would be an uninteresting recital. It will merely be noted that in 1887 there were seventeen experiment stations, located in fourteen states, and that in 1916 there were in existence sixty-six stations in the forty-eight states, no state being without one. There is not the slightest reason except inertia on the part of the farmer why he should not go to school the year round and become a scientific agriculturist while remaining on his farm. It may be stated, too, that this education costs him practically nothing.

Support. What are the various activities of these numerous experiment stations, and how are they supported? Since their success was first demonstrated it has not been difficult to finance them. The national government has been generous; the state governments have responded to heavy demands. Largely the stations are established in connection with agricultural colleges and share with the latter in state appropriations. The Federal government makes an annual appropriation of $30,000 to each state for the support of its station or stations, and an added $15,000 yearly to each state for carrying on original research work. Local state appropriations vary widely.

Scope of Work. That there may be little duplication of work, each station, as a rule, carries on one special line of original investigation while working in wider fields to meet local demands. The local work in each state includes investigations relating to the following:

The soil—its chemistry, physics and biology. This field includes drainage, irrigation, tillage, crop fertility, rotation of crops and fertilizers.

Plant life—its physiology, chemistry, nutritive value and history. New varieties are studied; increased productiveness is sought; new methods of selection and breeding are investigated; injurious insects and bacteria are studied with a view to eradication, and preservation of forests and reforestation receive attention.

Animals—breeds; diseases and their control; chemistry of foods; dairying; feeding; etc.

The matters undertaken in the line of original research, through which there will come some day a thoroughly organized science of farming, include the following: the chemistry of cream and milk and the construction of creameries; the care of poultry; butter-making; plant breeding; new diseases of plants;

developing larger and better fruits; reforestation; insecticides and fungicides; silos, etc.

That there may be conservation of energy and a medium of regular interchange of reports, there has been organized by the experiment stations and the agricultural colleges the Association of American Agricultural Colleges and Experiment Stations.

Help Brought to the Farm. The progressive farmer has a vital interest in the energetic work of the experiment station in his state. It works for him. If he cannot find the proper fertilizer for his soil, he can send some soil to the station for analysis. He will be told what it lacks and receive suggestions upon which he may act. He may inquire into irrigation questions; he can get instruction which will increase his success with poultry. The station (in some states) will send an expert, at cost, to consult with him on matters which may not have been standardized. He may write for and receive, without cost, bulletins on any farm subject which may be published by his station.

Canadian Experiment Farms. In general what has been stated above relative to agricultural experiment stations in the United States applies with equal force to like activities in the Dominion. In Canada these Federal institutions are called *experiment farms and stations.* What is known as the Central Experiment Farm, Ottawa, is the headquarters of the whole system, which includes the following complete list of farms, each farm being in charge of a local superintendent:

Farm or Station	Province	Acreage	Date Established
Central Farm, Ottawa	Ontario	467	1886
Kapuskasing Station	Ontario	1,282	1916
Harrow Tobacco Station	Ontario	49	1909
Charlottetown Station	Prince Edward Island	151	1909
Nappan Farm	Nova Scotia	460	1886
Kentville Station	Nova Scotia	434	1912
Fredericton Station	New Brunswick	520	1912
Ste. Anne de la Pocatiere Station	Quebec	340	1911
Cap Rouge Station	Quebec	339	1911
Lennoxville Station	Quebec	455	1914
La Ferme Station	Quebec	1,200	1916
Farnham Tobacco Station	Quebec	65	1912
Brandon Farm	Manitoba	625	1886
Morden Station	Manitoba	280	1915
Indian Head Farm	Saskatchewan	680	1886
Rosthern Station	Saskatchewan	650	1908
Scott Station	Saskatchewan	520	1910
Swift Current Station	Saskatchewan	640	1920
Lacombe Station	Alberta	850	1907
Lethbridge Station	Alberta	400	1906
Invermere Station	British Columbia	53	1912
Summerland Station	British Columbia	550	1914
Agassiz Farm	British Columbia	1,400	1886
Sidney Station, Vancouver Island	British Columbia	125	1912

In addition to the above there are small sub-stations at the following points: Swede Creek, Yukon Territory; Salmon Arm, British Columbia; Fort Vermilion and Beaverlodge, Alberta; Forts Smith, Resolution and Providence, Northwest Territories; and Betsiamites, Saguenay County, Quebec.

Range of Investigation. The work of the farms and stations covers the whole agricultural field, and each organization is a bureau of information for the agriculturist, horticulturist or stock raiser who needs solutions for his difficulties. The strictly scientific, or experimental phase of the work is carried on at the Central station at Ottawa, which is organized in the following divisions: extension and publicity, economic fiber production, illustration stations, field husbandry, animal husbandry, horticulture, cereals, chemistry, forage plants, botany, poultry, tobacco. See subheading, *Agricultural Education,* beginning on page 100. E.D.F.

Department of Agriculture

In the United States. The agricultural interests of the United States were first officially recognized by the government in 1836, when the Commissioner of Patents began in a small way to supply farmers with seeds. The purpose of seed distribution was commendable, for new and valuable plants were needed in many districts, and there were no local experiment stations to encourage their development. By 1862 the necessity for more definite and systematized assistance was seen, and in that year the Bureau of Agriculture was established; the work was transferred from the Patent Office and became a branch of the Department of the Interior, with the Commissioner of Agriculture in charge.

In 1889 this Bureau was raised to the rank of an executive department, styled the Depart-

ment of Agriculture, and its head was given a place in the President's Cabinet, with the title Secretary of Agriculture. This official thus became the eighth member of the Cabinet. The first secretary was Norman J. Coleman, who had been Commissioner of Agriculture. The fourth secretary was James Wilson, of Iowa; he was appointed by President McKinley in 1897 and remained in the office until March, 1913, a period of sixteen years. He served under four Presidents in succession, a record not before equalled by any Cabinet officer.

As organized in 1889 the Department included the bureaus of plant industry, animal industry, chemistry and soils, to which was added in 1891 the weather bureau; it assumed charge of all of the government agricultural experiment stations, and included as well the divisions of forestry, entomology and biological survey; a later division was organized to promote and encourage the national development for good roads, and the division of publications was established to serve all the bureaus. Stated briefly, the work of the various bureaus and divisions is as follows:

1. *Weather bureau;* conducts investigations in meteorology and climate; forecasts weather from twenty-four hours to three days in advance, warns of floods and announces coming storms. See WEATHER BUREAU.

2. *Bureau of plant industry;* conducts researches in every department of botany; reports on the history, distribution and utilization of forage plants; investigates varieties of fruits and grains with respect to their adaptation to particular soils and climates; collects seeds from every part of the world for testing at the experiment stations; purchases and distributes seeds annually through Congressmen (although this practice may be soon abandoned). It also studies and experiments with rotation of crops, a matter of great importance in those localities where farmers are inclined to raise on the same ground the same crops year after year, thereby exhausting the soil of certain elements of plant life.

3. *Bureau of animal industry;* studies animal diseases and means of combating them, and investigates methods of dairying; inspects imports and exports; supervises interstate shipment of cattle, and examines slaughter house products.

4. *Bureau of chemistry;* conducts researches in chemistry related to agriculture, particularly with foods, fertilization and soils. See subtitle *Agrieultural Education,* above.

5. *Bureau of soils;* conducts studies in physics as related to agriculture; surveys, locates and maps various kinds of soils.

6. *Division of forestry;* devotes particular attention to the conservation of forests, and the most economic use to which forests and forest products can be put. See FORESTS AND FORESTRY.

7. *Division of biological survey;* reports on geographic distribution of plants and animals, furnishing maps of zones; investigates the food and food habits of birds and all animals; introduces desirable birds and animals into localities where they have not before been known.

8. *Division of entomology;* studies the history and distribution of insects, determines which are beneficial and investigates means of extermination of those which are injurious.

9. *Good roads movement;* conducts experiments in road making and reports on economic features of road management. The government is undertaking to assist any state financially in its efforts to provide good roads. In 1912 Congress appropriated half a million dollars to help the states in their efforts toward road improvement; the act provided that for every dollar any state would appropriate for building good roads, the Federal government would give a like amount, up to $10,000. Construction of broad and smooth highways was expected to result from this movement. See ROADS AND STREETS.

10. *Division of publications.* The Department prints annually hundreds of books and pamphlets bearing upon the manifold branches of its work. Usually the latter are distributed free upon request, but a small charge is made in some cases; books are offered at practically the cost of production. The monthly list of publications of the Department will be sent at small cost regularly to any person who applies for it. Requests should be sent to the Chief of the Division of Publications, Department of Agriculture, Washington.

In Canada. The Canadian Department of Agriculture, unlike that of the United States, was one of the original departments of the government. Since the formation of the Dominion, it has ranked as the equal of any other Department, and its head is a member of the Cabinet.

The Canadian Department differs from that of the United States in the details of its organization. The principal difference is the absence of the forestry service and weather bureau; the former is a branch of the Department of the Interior, and the latter, officially known as the meteorological service, is a part of the Department of Marine and Fisheries. The branches of the Canadian Department correspond to the bureaus in the United States. Thus there are the dairy and cold storage commissioner's branch, the seed commissioner's branch, the health of animals branch and the publication branch. The Department as a whole has charge of agriculture, experimental farms, immigration, marine and immigrant hospitals, public health, patents, copyrights and trade marks. Canada is expanding so rapidly, particularly in the West, that the opportunities for the Department are increasing at a truly marvelous rate. E.D.F.

Courses in Agriculture for Schools

The effort to relate the work of the schoolroom to the outside life of boys and girls—the emphasis on the practical—is one of the most striking tendencies in modern education. It has resulted in the introduction of manual-training and domestic science courses in the public schools, in greater emphasis being placed on laboratory work in science courses, and what is of equal importance, it has given the study of agriculture a definite place in the school in many communities. The agricultural college has become too well established to excite comment; agricultural courses in town and rural schools are of more recent date, but their practicability and value, which have been weighed and not found wanting, are bringing them more and more into favor with educators everywhere.

Below is given a suggested course covering the months from September to June, inclusive. This may be adapted to the graded town schools or to those in rural communities. Any teacher will find it helpful as a basis of work, and it can easily be modified to meet local conditions. The object of this plan is to make the work in agriculture more than a text-book course; in other words, to make it a vital part of the pupils' every-day experiences.

SEPTEMBER

Practical work in the school and fields. September is the month for schoolroom demonstrations of selecting, testing, curing and storing seed corn. (In communities where this is not cultivated some other grain may be chosen.) It should be pointed out that the amount of moisture in seed corn at harvest time (from 20 to 50 per cent) is sufficient to cause serious trouble in case of early frost. Freezing of the water would result in its expansion, which in turn would cause the destruction of the germinating cells. There should be practical demonstrations of curing, or drying, the seed, and of storing it to protect it from mice and insects and to keep it from dampness and excessive cold. Another timely line of work is an excursion into the fields to observe their condition, to recognize and destroy weeds, and to collect seeds, insects and other material used in illustrative lessons. If the pupils have cultivated project fields of their own, they may be visited on these excursions.

Composition work. The local fairs should be attended, and each pupil should prepare a report of the exhibits. In connection with field work use notebooks. Descriptions of the pupils' experiences as summer gardeners may form the basis of drill in composition work, both written and oral. For practice in business letter-writing direct the pupils to write to various authorities for bulletins, periodicals and catalogues.

Exercises in reading and spelling. The supplementary-reading books of the school library and other books available should be utilized whenever possible. Such portions or passages as have a bearing on the work of the month should be carefully selected by the teacher and made a part of the reading lessons. The following are suggestive titles suitable for this purpose:

Fosdick's *Maize;* Longfellow's *The Legend of Maize* (in *Hiawatha*); Kingsley's *Eyes and No Eyes;* Pope's *Happy the Man;* Bryant's *To a Waterfowl;* Trowbridge's *Evening at the Farm;* Cooper's *Bobwhite.*

Agricultural journals and other farm periodicals or bulletins to which the school may have access should also be used.

The spelling lists of the regular lessons may be varied by the addition of new words learned by the pupils in their agricultural reading. As in the regular work, both the pronunciation and definition of these words should be learned. The list of terms they will encounter includes such words as *cankerworm, parasite, aphis, bindweed, weevil, environment,* etc.

Lessons in arithmetic. Measurements of the school yard and of fields, and computations of average yields of crops, cost per acre, profits, rate of interest on the investment, etc., are illustrative of what may be done in arithmetic. Use the agricultural work of the month as the basis of problems that involve the particular mathematical principles the pupils are then studying.

Lessons in geography. Give lessons in map-making. Some of the pupils, by personal observation, will be able to draw their own maps of the district, or sections of it, while others will succeed only in making copies of original maps made from surveys. Maps of the state or province may also be copied, and on these should be indicated the principal crops of different sections. Make comparisons of crops in different communities, states and provinces.

Work in history. The history of a community, state, province or nation cannot be studied apart from the industries of its people. Show how a particular period or section under consideration is connected with certain agricultural facts. The history of Northwestern Canada, for instance, has been affected by the opening up of the great wheat fields, and the part that corn and cotton have played in the history of the American people is well known. The plans for the regular lessons need not be dropped, but suggestive topics may be added and adapted to these plans. In planning both the history and the geography lessons, certain topics may be assigned to pupils for outside investigation, reading and inquiry. Reports on these topics should furnish opportunity for valuable classroom discussion. Make free use of texts, reference works, periodicals and newspapers.

Drawing lessons. As a part of the work in drawing, assign the sketching and coloring of parts of the corn plant, and of fruits, weeds and

insects. Drawings may also be made of such apparatus or tools as have been used during the month.

Exercises in physiology. The study of the various local crops with respect to their nutritive and fuel value, that is, their desirability as foods, is timely and important. Such topics can be included in the regular physiology assignments. Lessons in sanitation and hygiene should also be included, whenever it is feasible.

Manual training exercises. The making of shelves for exhibits, window boxes and seed-drying racks will occupy the energies of the boys, and the braiding of husk mats and baskets will interest the girls. The transplanting of garden plants into pots and boxes is another interesting line of activity. Such work can be varied indefinitely.

OCTOBER

Out-of-door work. Trips to the fields should be continued. Poultry of high grade, especially flocks with good records as layers, may be visited, and notes be taken as to the care given them. Soils should be gathered and stored in boxes or pails for lessons on soils and for germination experiments in the spring. Modern methods of harvesting and the machinery used should be examined carefully. October is also the month in which to destroy the garden weeds and rubbish in which insect pests may be hidden. Those who are interested in poultry may now make their selections among the layers at home, and begin fattening the chickens intended for the market. The ones who expect to have gardens the next season should plow their land this month.

A school fair. The month of October is an attractive time for a school fair or exhibit. The exhibits may include produce from the school garden, fruits and vegetables raised by the pupils in their project gardens, cooking, canning and sewing exhibits, and, if desired, specimens of the school work in manual training, drawing, etc. The matter of prizes may be left to the judgment of the individual schools. In some cases it may be well to have an auction sale of the exhibits to raise funds for the school library or for other improvements. Make the fair an event in the community.

Composition work. Descriptions of field excursions, reports on investigations, etc., should be carefully written up. Have each pupil prepare a description of the school fair, as if for one of the local papers. Also have each one compose a formal invitation to the fair.

Reading and spelling lessons. Among the reading selections appropriate for the season are Edward Everett's *The Farmers' Gold;* Whittier's *The Corn Song;* Burroughs' *The Apple;* Baldwin's *The Horse Fair;* Longfellow's *Hiawatha's Brothers.* Others may be found by the teacher. Continue the reading of agricultural journals and bulletins, and the drill on new words met in reading. Include in the spelling lists those terms misspelled in the compositions.

Drill in arithmetic. Assign problems similar to those suggested for September work. Have advanced pupils compute amount of lumber needed for poultry houses, silos, and other farm structures and apparatus (see LUMBER). Have neat and accurate statements made of the cost and income of various farm projects, also tabulated reports of the school exhibit.

Lessons in geography. Have recorded on maps and charts local surveys of crops and poultry. Study the commercial side of the community farming. Locate chief shipping points, lines of traffic and outside points from which produce is brought in. Locate on outline maps the chief agricultural areas of various countries.

Exercises in history. Make a special study of the effect of city growth on the development of neighboring agricultural districts. How have the needs of city-dwellers with respect to milk, poultry, butter, eggs and vegetables affected local farming? How, on a larger scale, are the different sections of a country and the different countries of the world affected by interchange of products? Show the work of national and state governments in encouraging farming, giving instruction, controlling plant and animal diseases, etc.

Lessons in drawing. Continue work of sketching and coloring fruits, grains, vegetables, etc. Have working drawings made of model farm structures.

Physiology lessons. Make a special study of the food value of poultry and eggs, and of the value and digestibility of such local crops as are used in feeding farm animals.

Manual training exercises. Have the pupils plan and construct a model poultry house, with full-sized nests and feed boxes.

NOVEMBER

Out-of-door exercises. Examination of high-grade poultry should be continued, in addition to inspection of cows and other farm animals. Investigate local methods of storing grain and of housing animals. Report on orchard work, if any is carried on. What methods of combating insect pests prevail? Note attention paid to cleaning and repairing of poultry houses, methods of fall planting of trees and shrubs, and how cutting, pruning and grafting are done. Complete the collection of soils and seeds begun in the previous month.

Composition work. Field excursions and investigations of farm equipment and various lines of fall work should be written up. Oral discussions of the subjects considered will increase the pupils' ability to use English. The Thanksgiving festival furnishes much timely material for compositions. Send short articles on various lines of school work to the local papers.

Reading and spelling lessons. Appropriate selections for the month are Thoreau's *Walden Pond;* Helen H. Jackson's *November Woods;* selections from Audubon's writings; Alice Carey's *November.* Continue use of periodicals and supplementary readers, and drills on new terms and misspelled words. Have an evening spelling contest which shall include many agricultural words.

Lessons in arithmetic. Assign problems based on cost of harvesting and marketing apples,

corn, potatoes, etc. Make computations of cost of feed for poultry, cows and other animals; also cost of egg production per hen and profit on various flocks.

Lessons in geography. Make a study of climate in connection with different plants. Find northern and southern limits of important products. Tabulate on maps or charts results of district poultry survey. Have indicated on outline maps the roads and other traffic routes used for commercial purposes.

History work. Have a study made of the origin and distribution of different varieties of poultry. Have the story of *The Geese that Saved Rome* and similar stories of fowls written up. Study local methods of marketing poultry. How has the development of railroads affected the history of the state or province? Make a study of rural festivals, especially Thanksgiving.

Drawing lessons. Assign sketching and coloring of typical fowls and of varieties of apples, berries, pumpkins and nuts, and working drawings of farm equipment. Have sketches made showing the historical development of modes of transportation from the era of the ox cart to the present time. Assign Thanksgiving sketches.

Lessons in physiology. In connection with the study of human breathing, point out value of constructing light, well-ventilated and roomy poultry houses. Extend this idea to other animal houses. Show that farm animals require different foods for winter, as do human beings. Make a special study of fruit as a food. Compare milk and eggs with other foods as to cost and food value.

DECEMBER

Practical exercises indoors and out. Modern methods of dairying may be studied. Investigate management of dairies and methods of marketing milk. If feasible have milk-testing exercises in the school. Begin examination of school collection of soils. Direct pupils to observe and take notes on habits and food of winter birds.

Composition work. Have reports of examination of dairies written out in full. Assign essays on such subjects as *An Ideal Ear of Corn, A Model Dairy, Proper Feeding of Cows (or Poultry), How to Test Milk,* etc.

Reading and spelling lessons. For supplementary reading choose such selections as Whittier's *Snow Bound;* Burroughs' *Our Rural Divinity;* Hawke's *The Winter Herd Scene* (from *Shovelhorns*). Use such dairy and poultry journals as are available. Drill on spelling and correct use of new scientific terms.

Work in arithmetic. Assign problems based on milk records, feed computations, and cost and profits of dairy and poultry projects. Have pupils invent problems dealing with money saved by use of sprays and other insect destroyers; also probable saving to farmers through winter birds which feed on insect pests.

Lessons in geography. Have outline maps drawn of township or county. Locate thereon industrial plants connected with farming, such as gristmills, grain elevators, creameries and cheese factories. Trace connection between local and distant markets for farm produce. Enumerate the steps from farm to home of consumer. Make climatic records, such as depth of freezing, dates of early frost and snowfall, amount of snowfall, etc. Tabulate number of dairy cattle in district, with statistics as to breeds, amount of milk and butter produced, etc.

History lessons. Compare modern farming methods with past methods. How have these been modified by historic events? What great men began life on farms, Why is the farmer considered so important to-day?

Work in drawing. During examination of dairies have working drawings made of milk-testing machines. Have different parts of a cream separator drawn. Make a sketch of an ideal dairy cow, dividing it into sections and enumerating each, as flank, thigh, etc. Winter birds and scenery may also be assigned.

Physiology lessons. Make a practical application to the care of farm animals, of what was learned in physiology concerning winter exercises, ventilation and exposure. Point out the value of vigorous exercise in winter, both in work and in sports.

JANUARY

Practical exercises indoor and out. Work in milk testing may be continued. Pupils planning to raise chickens should select the breeding fowls and see that they have suitable food. Egg testing and care of market eggs are now important lines of work. Let each pupil decide on some home project for the coming season. Local factories and warehouses dealing in agricultural material should be visited.

Composition work. The winter season suggests an abundance of topics for oral and written composition. Have pupils write descriptions of trips, investigations, sports, winter birds, etc. Report on the feeding of cows and poultry. Letters to available authorities for seed catalogues and publications regarding spring work are now timely.

Reading and spelling lessons. The following are suggestive of what may be used in supplementary reading: Stevenson's *Winter Time;* Lambs' *Essay on Roast Pig;* Venable's *The Forest Song;* Lowell's *Winter;* Morris' *Woodman, Spare that Tree;* Longfellow's *The Home Song.* Publications on forestry, milk and eggs, especially on shipping eggs, should be obtained. Continue drill on spelling, pronunciation and use of agricultural terms.

Problems in arithmetic. Give problems based on records from milk testing combined with milk-production records; make computations of yield of butter fat, value in money and estimated profit. If feed records can be obtained find exact profit over feed cost. Use egg records and accounts of poultry feed as a basis for similar computations. Make computations of amount of fertilizer needed on specified fields and gardens. Ascertain volume and capacity of ice houses (in tons). Get measurements of woodpiles, logs and lumber, and use in problems.

Lessons in geography. Make a study of origin and present source of materials used in fertilizers. Read dairy records of different states,

provinces and countries and make comparisons. Have pupils make outline maps of home farms and locate thereon fields and crops decided upon. Different soils should be indicated by color or shading. Take up the study of the lumber industry, national forestry, different varieties of native and imported woods, importance of ice in modern dairy farming. Study methods of producing, storing and transporting artificial and natural ice.

Lessons in history. The subject of the forests opens the way for several important related subjects—development of the lumber industry, its effect on settlement, the conservation movement, etc. Historical forests of the world may be studied. Compare present winter conditions of the farm with those of pioneer days. To what extent was the farm self-supporting then? What industries then carried on have since been taken from the farm?

Drawing lessons. Farm animals and winter trees make good subjects for sketches. Lumbering and ice-cutting tools may also be assigned.

Lessons in physiology. The following subjects may be taken up: Diseases and accidents common to winter; dangers of using milk from tuberculous cows; milk and cream as disease carriers; how to prevent epidemics; local and national health laws.

Manual training exercises. Have the pupils construct egg testers, apparatus for testing corn, models of stables and poultry houses, and bird houses.

FEBRUARY

Practical exercises indoors and out. Detailed plans for garden and field projects may now be made. Show different methods of testing corn and other seeds. Assign home work in testing and ask for reports. Sow seeds in hotbeds or window boxes to obtain early plants, and study their germination and growth. Egg testing may be continued at school and at home. Have a neighborhood meeting in the school to show ability of pupils to test seed, milk and eggs and to judge corn.

Composition work. Direct the pupils in the writing and mailing of orders for seeds and for agricultural bulletins. Have all records and reports written out carefully.

Reading and spelling lessons. For supplementary readings select such titles as Pope's *Happy the Man;* Longfellow's *The Home Song;* Caroline Norton's *The Arab to his Steed;* Burns' *To a Mouse.* Get literature on school gardens, the home vegetable garden, egg marketing and poultry raising. Have a neighborhood spelling contest, making use of all agricultural terms the pupils have used.

Arithmetic problems. Assign practice work in the making of invoices, checks, receipts and other business forms. Make computations of garden areas; have the space for each variety of vegetables laid out to scale. Problems assigned may be based on sales of eggs, cost of marketing and net income. Using figures found in milk testing, find the values of the butter fat per hundredweight of milk. Allowing thirty cents per hundredweight for skimmed milk, what is the total value of specified quantities of milk? Compute income from specified cows.

Geography lessons. Have pupils make a district survey map showing kinds of seeds used for garden and field crops. Make comparisons; which gives better results—home-grown or purchased seed? Which are the most profitable garden crops? Make a study of demand and supply. What possibilities are there for good and bad yields for the coming season?

Lessons in history. Have pupils make a study of the history of certain important local crops. Trace back to date when each was first used as a food. How are new fruits and vegetables made available for human food? Why are certain well-known vegetables or grains not raised locally?

Drawing lessons. The seed planting in window boxes gives opportunity for sketching the development of the germinating plant up to the opening of the true leaves. Have working drawings made of seed testers; plan and make patterns for egg tester and shipping cases. Have home and school gardens drawn to scale.

Lessons in physiology. Make a study of local, state or provincial laws concerning sanitation. Wherein are these laws inadequate? Are the people of the rural sections as well protected as those of the cities in regard to water supply, sewage, infectious diseases, clean milk, etc. Study methods of heating and ventilation in the community. Criticise the school facilities.

Manual training exercises. Have pupils construct seed and egg testers, window boxes and shallow boxes, or "flats," for starting seeds. Make a model of a hotbed or cold frame.

MARCH

Practical exercises indoors and out. Make preparations for incubation of eggs. Make visits to a successful poultry plant to study methods of incubation. Prepare cold frames for seeds. Begin early planting of lettuce, tomatoes, pansies and other plants, under glass or in "flats." As soon as weather permits have field demonstrations of grafting, pruning and spraying. Begin setting out of fruit trees.

Composition work. Have written and mailed necessary letters regarding seeds, fertilizers or tools. Have a full report written whenever a hen is set or an incubator started. Direct pupils to write full descriptions of field trips and visits to establishments.

Reading and spelling lessons. For supplementary reading use material on rural life, such as Grady's *The Homes of the People;* Holmes' *The Plowman;* Hamlin's *The Meadow Lark;* Aldrich's *Bluebird;* Mackay's *Tubal Cain;* Riley's *Out at Old Aunt Mary's;* and the *Parable of the Sower,* from the Bible. Use bulletins and periodicals on special garden vegetables, incubation of hens' eggs and other seasonal topics.

Problems in arithmetic. Poultry records, bills for seed, fertilizer and tools, orchard work and dairy projects furnish material for problems. Wherever feasible, study methods of assessing taxes and their relation to farm management, and invent problems involving the facts learned.

Geography lessons. Peculiarities of the local climate with respect to early spring farm work should be studied. Have maps drawn showing the market radius for various products. Indicate with ink of different colors the places where local farm supplies are purchased. Have maps drawn of state or province and have indicated thereon farmers' associated creameries, etc. Compile information regarding late spring frosts and dates for planting or transplanting.

History work. The following subjects are suggested for classroom discussion, after they have been looked up by the pupils: sources of food supply and transportation facilities in the early days of the nation; the effect of crops and industries in certain sections; the attitude of those sections toward national issues; the inter-relation between agricultural progress and invention.

Drawing lessons. For sketching material use seedlings, buds, open or bursting, tools used in grafting and pruning; in certain localities a sugar camp is an excellent subject. Have diagrams made of cold frame, brood nests or incubator.

Physiology lessons. Make a further study of foods and compare different varieties of fruits and vegetables as to food value. Study the digestion of starch in the human body and in plants. Begin spring clean-up campaign, with special attention to breeding places of flies and mosquitoes.

Manual training exercises. Direct pupils to construct brood nests, transplanting boxes and wooden garden labels. Make sample crates for shipping eggs.

APRIL

Practical exercises indoors and out. Arrange for demonstrations of methods of hatching and early brooding of chickens, and of transplanting tomatoes and other plants started in cold frames. Plowing and harrowing of project fields and gardens should be undertaken. Make a garden and crops survey of the district. Have records kept of habits and food of returning birds. Now is the time for planning and beginning work on the improvement of the school grounds. Bird houses may be placed and fruit and shade trees planted. Make plans for the fall exhibit before planting crops.

Composition work. Assign written reports of excursions, demonstrations and work begun on projects. There are many timely subjects for essays, such as early care of chickens, starting tomato plants, neighborhood birds, etc. A useful drill in composition is the arrangement of a tree-planting exercise. See ARBOR DAY.

Reading and spelling lessons. For supplementary readings choose such selections as Alice Carey's *That Calf;* Whittier's *The Barefoot Boy;* Riley's *South Wind and Sun;* Bryant's *The Song of the Sower;* Helen Hunt Jackson's *April;* Brown's *In the Heart of a Seed;* Emily Miller's *The Bluebird;* Saxe's *Solomon and the Bees.* Look up reading matter on the home fruit garden, annual flowering plants, managing poultry, how to grow an acre of corn, incubators, how to make and use bird houses. Continue drill on words.

Problems in arithmetic. Base the problems on areas for each crop, amount of fertilizer used, estimated crop, etc. Make estimates of damage prevented by insect-eating birds. Continue use of poultry, feed and milk records in devising problems.

Geography lessons. Trace, by means of newspapers and personal investigations, the sources of and nearest large market for the supply of eggs and poultry. Locate on state or provincial maps the chief producing areas and large markets for tomato plants, ripe and canned tomatoes or other produce. From what sections do the best supplies come? If local output is below par, how could it be improved?

History lessons. Study the history of national legislation with respect to agricultural education. Make a survey of agricultural schools and colleges established by provinces or states and the nation. What advantages have farmers to-day as compared with those of a century ago. Begin study of the movement to save the birds.

Drawing lessons. Make illustrations showing how small plants and fruit trees are transplanted. Make working drawings to illustrate construction of bird houses; also of garden markers and other implements.

Physiology lessons. Begin a district sanitary survey which shall include water supply, disposal of sewage, control of flies and mosquitoes and other features of home sanitation. Include care of milk and other foods, dairy inspection, tests for tuberculosis, etc. Give a lesson on the interchange of carbon dioxide and oxygen, showing how plants and animals aid one another. See PLANTS.

Manual training exercises. Construct bird houses, garden markers and transplanting trays. Have needed repairs of school apparatus made. If Arbor Day occurs in this month, have a tree set out and a trellis made for its protection. It is a good plan to have a road drag made and to see that it is used in the district.

MAY; JUNE

Practical exercises. Those who live in the fruit belt should visit orchards and observe methods of spraying trees to kill insects. Complete work of planting or transplanting in school gardens, and all other projects. Arrange with local farmers to have the pupils see practical demonstrations of field cultivation and methods of controlling insects. Make observations of early feeding and summer care of chickens.

Composition work. Reports of planting and other field and garden work may be written up. Also have descriptions written of field trips and demonstrations.

Reading and spelling lessons. It will be easy to find numerous selections appropriate for the summer season. Choose such titles as Mann's *The Farmer's Creed;* Anderson's *The Pea Blossom;* Saxe Holm's *A Song of Clover;* Howells' *Song of the Oriole;* Longfellow's *Blessing the Cornfield* (from *Hiawatha*) and *Birds of Killingworth;* Lowell's *A Day in June.* Search for literature on the apple and corn and their cultivation. Continue reading on the fly. All the

OUTLINE AND QUESTIONS ON AGRICULTURE

Outline

I. What It Is

II. Its Importance

(1) Practically all foodstuffs produced by it
(2) Almost all clothing materials

III. History and Progress

(1) Primitive Methods
(2) Animal labor
(3) Modern machinery
(4) Decreased cost of production

IV. Causes of Progress

(1) Better transportation
  (a) Roads
  (b) Railways
  (c) Waterways
(2) Farm machinery
(3) Application of chemistry to soils
(4) Spread of agricultural education
  (a) Colleges
  (b) Rural schools
  (c) Clubs and institutes
(5) Scientific farming
(6) New methods of combating disease and insect pests

V. Branches of Agriculture

(1) Grain raising
(2) Other crops
  (a) Potatoes
  (b) Flax
  (c) Cotton
  (d) Tobacco
  (e) Forage crops, etc.
(3) Horticulture—raising of
  (a) Fruits
  (b) Garden vegetables
  (c) Flowers
(4) Stock-raising
(5) Dairying
(6) Poultry-raising
(7) Bee-keeping

VI. Future Possibilities—governed by

(1) Increase in land value
(2) Increasing demand for food products
(3) Governmental assistance
(4) New investigations

VII. Improved Rural Conditions—due to

(1) Better communication facilities
  (a) Telephone
  (b) Automobile
  (c) Rural mail delivery
  (d) Parcel post
(2) Spread of education
  (a) Agricultural courses in many schools
  (b) Periodicals
  (c) Traveling libraries
  (d) Consolidated schools

VIII. Specific Topics

(1) Farm equipment
(2) Soils
  (a) Formation
  (b) Classification
  (c) Texture
  (d) Relative value
  (e) Exhaustion
(3) Fertilization
(4) Drainage and irrigation
(5) Cultivation
(6) Harvesting
(7) Crops
  (a) Localization
  (b) Relative values
(8) Seed
  (a) Testing
  (b) Methods of seeding
(9) Plant and animal diseases
(10) Weeds
(11) Farm arithmetic

Questions

How does agriculture rank in importance among the industries?

Can you think of any common article of food with the production of which the farmer has nothing to do?

Are the textile industries as dependent upon the farmer's activities as are those connected with food?

What is that branch of agriculture called which has to do with the raising of fruit?

How are the birds of use to the farmer?

What is a silo? Has it played a very large part in recent agricultural development?

Outline and Questions on Agriculture—Continued

What are the principal grains?
In what parts of North America is flax grown?
How does agriculture rank in importance among the industries?
Trace the steps in the development of the plow.
If the farmer of thirty years ago could visit a fully-equipped modern farm, what are some of the things he would see which would amaze him?
How much less does it cost now to produce a bushel of wheat than it did a half century ago?
Is it of any advantage to the farmer to understand the principles of chemistry?
What change has there been in the attitude of the farmer toward agricultural education?
What is an agricultural experiment station?
What is meant by the statement that agriculture has become "a science as well as an art"?
What enemy does the grower of cotton most dread? the grower of wheat?
What insecticides can the farmers use to rid themselves of these pests?
What is the most widely extended branch of agriculture?
Name some of the principal forage crops of Canada and the United States.
Is it necessary for the dairy husbandman to raise any crops at all?
What conditions are necessary to the growing of rice?
What is meant by intensified farming?
Would you trade the proceeds from the wheat crop in the United States for those received from poultry?
In what way can clover benefit the soil?
Is the earthworm a hindrance or a help to the farmer?
Make a list of the various kinds of soil.
Describe briefly three great irrigation projects
In what way are school gardens helpful?
How are oats tested for seed?
How can you recognize an apple tree when it is bare of leaves? a cherry tree?
Should a farmer shoot robins?
What is a weed? Name several of the most troublesome, and tell how they should be dealt with.
What were some of the reasons for the strong "away from the farm" tendency?
How do the departments of agriculture of Canada and the United States stand ready to assist the farmers?
Name four or five causes of the "back to the farm" movement.
What are "consolidated" schools? Of what help are they to the community?
How does the winter life of a farmer's family differ from winter life on a farm of a score or more of years ago?
With the aid of the indexes and articles in these volumes, answer the question which troubled John and Mary—where does bread come from?
How many hours' labor does it take, according to the present estimate, to grow a ton of hay?
What is meant by dry-farming?
In what parts of the United States and Canada is dry-farming practised?
How can a farmer be absolutely certain as to which of the crops he is raising are profitable? (See BOOKKEEPING, subhead *Farm Bookkeeping.*)
Under what headings would a farmer open his various accounts?
About how much rainfall must a region have in order that ordinary farming may be profitable?
What do you understand by grafting?
What has been accomplished by canning clubs?
Why is Luther Burbank called the "plant wizard"?
Name some of the cattle diseases the stock-grower has to combat.

topics for summer work will provide new spelling lists.

Problems. Assign problems based on plowing, harrowing and planting. Estimate cost of crops up to this time, making allowances for rent of land and cost of fertilizer, seed and labor. The home and school gardens, flocks of chickens, etc., will furnish material for other problems. Have each pupil keep an accurate record of his own projects.

Geography lessons. Study the common insect pests with reference to their origin and distribution. Make a similar study of weeds. Suggest that the pupils make collections of pictures showing farming methods carried on in European countries. Locate fruit and vegetable canning factories which utilize crops produced in the community. Can crops of home projects be raised and canned at such cost as will enable the output to compete with factory products? How would they compare in quality?

History lessons. Trace the methods of plowing, cultivating and harvesting from pioneer days to the present; show development of farm implements. What has been the effect of invention of farm machinery on distribution of crop acreage and types of farming? Trace also the domestication of animals.

Drawing lessons. Apple or other fruit blossoms in different states of growth may be sketched. Sketch a codling moth or other insect pest. Draw parts of apparatus and improved machinery. Fill in the details of garden maps begun previously.

Physiology lessons. Give lessons on first aid to the injured. Show pupils how to deal with cuts, sprains, fractures and burns, and poisoning from weeds. Study preservation of foods in the home. Continue study of fly control.

Manual training exercises. Manual work in May and June can best be done in the fields and gardens. In some communities it may be practicable to construct a fireless cooker and demonstrate its use. B.M.W.

Consult Bailey's *Cyclopedia of American Agriculture,* and his *Rural Scienee Series;* Voorhees's *First Principles of Agriculture;* Carney's *Country Life and the Country School;* Warren's *Farm Management;* Earle's *Southern Agriculture.*

Related Subjects. Those who wish to make a systematic study of agriculture are referred to the topics below, each of which will be found in its alphabetical order in these volumes. The topics are arranged in groups according to their relations:

FARM EQUIPMENT

Agricultural Machinery
Barn
Binding Twine
Flail
Hoe
Mowing Machine
Plow
Reaping Machine
Scythe
Silo
Sowing Machine
Thrashing Machine
Traction Engine

SOIL TREATMENT

Agricultural Chemistry
Drainage
Dry Farming
Fertilizers
Guano
Gypsum
Irrigation
Manures
Phosphates
Rotation of Crops
Soil

CROPS

Alfalfa
Barley
Buckwheat
Clover
Corn
Cotton
Flax
Hay
Kaffir Corn
Millet
Oats
Rice
Rye
Wheat

Fruit (see *Fruits,* below)

FRUITS

Alligator Pear
Almond
Apple
Apricot
Banana
Bergamot
Blackberry
Brazil Nut
Breadfruit
Butternut
Casaba
Cherry
Chestnut
Citron
Cocoanut
Crab Apple
Cranberry
Currant
Fig
Gooseberry
Grape
Grapefruit
Guava
Huckleberry
Kumquat
Lemon
Lime
Logan Berry
Loquat
Melon
Mulberry
Muskmelon
Nectarine
Orange
Pawpaw
Peach
Peanut
Pear
Pecan
Persimmon
Pineapple
Pistachio
Plum
Pomegranate
Prune
Quince
Raspberry
Strawberry
Walnut
Watermelon

VEGETABLES

Artichoke
Asparagus
Bean
Beet
Brussels Sprouts
Cabbage
Carrot
Cauliflower
Celery
Chard
Cucumber
Eggplant
Gumbo
Kohl-rabi
Lentil
Okra
Onion
Oyster Plant
Parsnip
Pea
Potato
Pumpkin
Radish
Squash
Sweet Potato
Tomato
Turnip

ENEMIES OF PLANTS

Blight
Boll Weevil
Brown-tail Moth
Chinch Bug
Codling Moth
Curculio
Ergot
Grain Beetle
Gypsy Moth

See also

Herbicides
Paris Green
Mildews
Locust
Potato Bug
Diseases of Plants
San Jose Scale
Scale Insect
Smuts
Weevil
Insecticides and Fungicides

STOCK AND POULTRY RAISING

Breeding
Cattle
Cow
Duck
Egg
Ensilage
Fowl
Goat
Hog
Horse
Incubator
Pigeon
Poultry
Sheep
Turkey

THE DAIRY INDUSTRY

Butter
Buttermilk
Cheese
Churn
Cow
Creamery
Dairying
Milk
Separator, Cream

ANIMAL DISEASES AND INSECT PESTS

Animals, Diseases of
Anthrax
Distemper
Foot and Mouth Disease
Gapes
Heaves
Glanders
Lumpy Jaw
Mange
Rinderpest
Sheep Tick
Spavin

See also

Veterinary Medicine

AGRICULTURAL EDUCATION

Agricultural College
Agricultural Education
Agricultural Experiment Station
Agriculture, Department of
Canning Clubs
Farmers' Institute

GENERAL TOPICS

Birds, subhead
Relation to Man
Gardening
Grafting
Greenhouse
Horticulture
Hotbed
Nursery
Pruning
School Garden

AGRIGEN'TUM, the modern city of Girgenti, was founded on the southern coast of Sicily about 582 B. C., by a Greek colony from Gela, and was once one of the most important places on the island. It possessed many fine buildings and was recognized as a seat of culture; ruins of the Temple of Jupiter, the most magnificent in Sicily, are still to be seen. Agrigentum has never possessed its ancient splendor (although partially rebuilt in 340 B. C.) since its destruction at the hands of the Carthaginians in 405 B. C. It was conquered by the Romans during the first Punic War and was under the control of the Saracens from 825 to 1086 A. D. Once a city of 200,000, Girgenti now has about 22,000 inhabitants.

AG'RIMONY. Though belonging to the rose family, this genus of plants differs widely from the roses, occurring as a wayside weed, with deeply indented, downy leaves and small, yellow flowers at the end of a tall stalk. It has an aromatic odor and a bitter taste. An infusion of the dried leaves is used as a gargle in some forms of throat trouble.

AGRIPPI'NA (A. D. 16-59), called Agrippina the Younger, was the mother of Nero, and a woman of whom it is impossible to say a good word. After having poisoned her second husband she married her uncle, the Emperor

AGRIPPINA THE YOUNGER

Claudius, whom she induced to disinherit his own son in favor of her son Nero. She then poisoned Claudius, placed Nero on the throne and prepared to govern through him, but he proved to have a strong will of his own. When she plotted against him he had her put to death. See Nero.

AGUAS CALIENTES, *ah' gwas kahl yen'-tazc,* capital of the Mexican state of the same name, situated on a plateau 6,000 feet above sea level, 300 miles northwest of Mexico City. There are many hot springs in the neighborhood, hence the name, which in Spanish means *hot water.* In times of peace it is a flourishing city, with important manufactures of cotton, tobacco, leather and pottery. The surrounding country is rich in minerals, particularly silver, copper and lead. Population in 1910, 45,198.

A'GUE, a common name for malarial fever. It is caused by a certain animal parasite, and is communicated to man through the bites of mosquitoes poisoned by this parasite. The attacks come at regular intervals; in some forms they occur twice in twenty-four hours, in others once a day or every other day. In some cases there is an interval of two days between attacks. There are three stages in the progress of ague. First, the patient feels a coldness creep up the back and spread over the body;

he shivers, his teeth chatter and his face, lips, ears and nails become blue, while his temperature rises to 102° or more. In the course of time the coldness is succeeded by warmth, the face becomes red and the head aches. In this stage the fever is between 103° and 105°. Finally, the skin becomes soft and damp, the patient sweats profusely, and, the fever having gone down, he falls asleep. Quinine is almost the only medicine known which is a satisfactory remedy for ague. The best means of preventing the disease is by exterminating the mosquito in sections which are known to be malarial. Special attention should be given to destroying their breeding places. See MALARIA.

AGUINALDO, *ah ge nahl' do,* EMILIO (1870-), a notable character at the age of twenty-nine, in connection with American occupation of the Philippine Islands. He was the leader of stubborn resistance to United States authority, which ended only with his capture by Colonel, later Major General, Frederick Funston.

Aguinaldo had a varied career up to 1898, the year the islands were occupied by American forces. His parentage was unknown. He was reared by a priest and received a good education, intending to become a physician. Before he was twenty he was obliged to leave home to escape arrest, and in Hongkong learned some of the methods of European warfare. For a time the adventurous youth is said to have served in the Chinese navy. When Dewey's fleet ended Spanish authority in the Philippines, he returned home, with the good intention of aiding the American authorities. However, he was offended because he was not recognized at his own appraised value, and within a year headed a very formidable revolt against the Americans. His forces were driven to the mountains, where for two years resistance continued.

Aguinaldo was well-treated after his capture, became reconciled to those in authority, and set a good example to his followers by becoming a useful citizen. He is now prosperous as a gentleman farmer near the city of Manila.

AGULHAS, *a goo' lyas,* CAPE, the southernmost point of Africa, avoided by mariners because of the storms which frequently rage around it. It is about 100 miles east and south of Cape Town, and is marked by a lighthouse whose beacon may be seen nearly twenty miles.

A'HAB, the seventh king of Israel, who, influenced by his evil wife, Jezebel, set up the worship of Baal and cruelly persecuted the true prophets. Jezebel was so notorious that the name has come to signify any sharp-tongued, scheming, ungovernable female. Ahab reigned from about 875 to 853 B. C., and was bitterly opposed by the prophet Elijah. His history is told in the last seven chapters of *I Kings.*

AHASUERUS, *a haz u e' rus,* in Bible narrative a king of Persia, to whom the beautiful Queen Esther made her appeal to save the Jews from the wicked plot of Haman. Around these characters centers one of the most appealing stories of the Bible, found in the *Book of Esther.* This king is thought to have been Xerxes I. Ahasuerus is also a Scripture name for Cambyses, the son of Cyrus (*Ezra* IV, 6), and for Astyages, king of the Medes (*Dan.* IX, 1). See ESTHER.

A'HAZ, son of Jotham, was the twelfth king of Judah and ruled from 736 to 728 B. C. His reign was marked by a return to idolatry, and at his command the Temple was plundered to secure presents for Tiglath-pileser, the king of Assyria, whose aid had been sought against the Syrians (*II Kings,* XVI).

AÏDA, *ah e' da,* an Italian opera composed by Verdi in 1871 to celebrate the opening of the grand opera house at Cairo, Egypt. Verdi was chosen for this honor by Ismail Pasha, the Khedive of Egypt. The scenes are laid at Memphis and at Thebes, and the opera relates the story of Aïda, daughter of the king of Ethiopia, and her lover, Radamès, captain of the Egyptian royal guard. The lovers prefer death to separation, and the curtain falls upon their death song in a vault beneath the temple. The music is elevated and there are many passages of majestic beauty. Melba, Nordica and Carolina White are among the great prima donnas who have sung the part of Aïda.

AID-DE-CAMP, *aid de kamp',* or *aid-de-kaN',* an officer who serves on the staff of a general, and assists him in performing his military and social duties. In time of war the duties are arduous and dangerous, and the successful aid must be alert, resourceful and prompt. Modern warfare has considerably changed the duties of aids-de-camp. The automobile has taken the place of the horse, and the telephone and telegraph facilitate the sending of orders, but the duties of the aid still take him constantly into the zone of danger. The position carries great military and social prestige, and is eagerly sought by young officers of all branches of the army.

AIKINS, *a′ kinz,* James Cox (1823-1904), a Canadian statesman, for many years one of the leading Conservatives of the Dominion, best known as the author of the Public Lands Act, under the terms of which he then organized the Dominion Lands Bureau. Though he began life as a farmer, he was chosen to the legislature in 1844, when he was only twenty-one years old, and from then until his death was always conspicuous in politics. From 1869 to 1873 and from 1878 to 1880 he was Secretary of State under Sir John A. Macdonald, and from 1880 to 1882 was Minister of Inland Revenue. He then served a five-year term as lieutenant-governor of Manitoba, and for the remainder of his life sat in the Dominion Senate.

His son, Sir James Albert Manning Aikins (1852-), one of the leading barristers of the Dominion, president of the Canadian Bar Association since 1914. After graduation from Upper Canada College and the University of Toronto, he studied law, was called to the bar in 1878, and was created Queen's Counsel in 1884. For thirty years, 1881 to 1911, he was the Winnipeg counsel for the Canadian Pacific Railway, and from 1911 to 1915 represented Brandon in the Dominion House of Commons. After the fall of the Roblin ministry in 1915, Sir James took an active part in reorganizing the Conservative party in Manitoba and was chosen its leader. Though the task was hopeless, he accepted it; he resigned his seat in the Commons and offered himself as member for Brandon in the legislature, but was defeated. Sir James has given largely of his time to various educational enterprises; he is a director of Wesley College and of Manitoba Agricultural College, is a member of the council of the University of Manitoba and has been its honorary bursar since 1887, is a member of the Board of Visitors, Royal Military College, Kingston, Ont., and an honorary officer in two regiments. He was knighted on January 1, 1914.

AILANTHUS, *a lan′ thus,* a tree whose leaves are second only to those of the mulberry in importance as food for silkworms. It is native to China and Japan, but because it is a handsome tree, valuable for shade and for its timber, it has been extensively introduced into Europe and the United States. The leaves are much like ash leaves, and the flowers, which have a most unpleasant odor, are small and greenish. Ailanthus silk is much cheaper and more durable than mulberry silk, but is not so soft and glossy.

AINO, *i′ no,* or **AINU,** *i′ noo,* the name of the hairy, brown, short-statured race which peoples the island of Yezzo, the Kurile Islands and parts of Saghalien, and is perhaps the original race of Japan itself. The Ainos, who number about 20,000, are still uncivilized. Their religion, in which a sort of bear-worship figures, in some respects resembles that of the American Indians. They are said to average less than five feet in height.

AINO MAN AND WIFE

AIR, the element in which human beings and plants and animals live and breathe, is an invisible mixture of gases which can be weighed, expanded or compressed, transformed into a liquid, or even frozen into a solid.

Weight. That air has weight was observed by Galileo, about 300 years ago, from the operation of a pump which sucked water in the same manner as an ordinary kitchen or well pump of to-day. When you press the handle of the pump, you pull the air out of the pipe (see Air Pump). The water in the cistern or well is weighed down by air and forces the water in the pipe, which is bearing no weight, to rise. Torricelli, a pupil of Galileo, proved that the weight of the air over a square inch of surface equals that of a column of mercury about thirty inches high. At the sea level one square inch sustains the weight of about 14.7 pounds of air, but at higher points in the atmosphere the pressure is of course less (see below). It also varies with the state of the weather, and Torricelli's apparatus has become the barometer, an instrument which foretells storms. See Galileo; Torricelli; Barometer.

Weight, we know, is a universal property of matter. Therefore, as air has weight, it is made up of particles of matter. Under pressure these particles come closer together, so the air at the earth's surface is more dense than that higher up. About thirty-three miles above us, scientists say, the particles do not even touch each other. Just how far from the earth there ceases to be any we do not know. We are

sure, however, that there are some at a height of one hundred miles, because about that distance away grains of dust falling toward the world are set on fire by friction with them, and become shooting stars. See METEOR.

Buoyancy. As the tendency of air is to expand, any portion of it presses upward against the weight of the air above. Normally this upward pressure exactly equals the downward pressure at the same point. If it were less, the air would be further compressed; if it were greater it would expand. For the same reason the pressure is equal in all directions. Without this elastic upward pressure you could not in the open air turn the leaf of this book, for the weight of the air upon it would be nearly a half a ton.

If any object is lighter than the air which it displaces, its downward pressure, due to gravity, is less than the upward pressure of the air underneath it, and it rises. Thus a balloon filled with light gases ascends till it reaches a point where it equals in weight the rarer atmosphere it displaces.

An opened newspaper floats gently to earth, while the same paper, folded, falls rapidly. In the first instance the downward force of its weight is distributed over a larger surface, thus reducing the pressure which drives the air from under the paper in order that it may fall. The flight of a heavier-than-air machine depends upon this buoyancy; its planes do not keep it from falling, but make it fall more slowly, so that its engines are able to support it (see FLYING MACHINE). In a vacuum all things fall with equal rapidity, and only in a vacuum can objects be accurately weighed.

What the Air Is Made of. The proportion of gases in the air varies with place and height. About seventy-nine per cent is nitrogen, nearly twenty-one per cent, oxygen. Water vapor, carbonic acid gas, traces of ammonia, ozone, argon, helium, neon, krypton, xenon and minute particles of animal, vegetable and mineral matter form the very small balance. Because plants absorb carbonic acid gas and return oxygen to the air, while men reverse this process, city air has less oxygen than country air. Coal, oil, natural gas and other substances in the earth which have been formed by plants or animals formerly living on it, contain gases extracted from the air, so there is probably slightly less atmosphere around us than there was a few thousand years ago. But it is believed that the proportions of its parts remain the same.

What the Air Does for Us. Besides furnishing oxygen for us to breathe, the air in other ways enables us to live. It absorbs heat from the sun, giving it out to us during the hours of darkness; without an atmosphere the earth would be burning hot by day and intensely cold by night. It is also a medium for sound waves, which, unlike light, travel only through material bodies. It turns our windmills; makes air brakes possible; we ride on air in automobiles; we have many machines which operate by compressed air; the housewife uses air in vacuum cleaners to make her work less tiresome. See WIND; AIR BRAKE; COMPRESSED AIR; LIQUID AIR; GEOLOGY. C.R.M.

Outline for the Study of Air

1. What air is
2. Weight
   - (a) How discovered
   - (b) Weight of air at sea level
   - (c) Why air far above the earth weighs less
3. Buoyancy
   - (a) Equality of pressure
   - (b) Why balloons rise
   - (c) Why airships do not sink
4. Composition
   - (a) Nitrogen
   - (b) Oxygen
   - (c) Water vapor
   - (d) Other gases
5. What air does
   - (a) Furnishes oxygen
   - (b) Absorbs sun's heat
   - (c) Permits passage of sound
   - (d) Operates mechanical contrivances

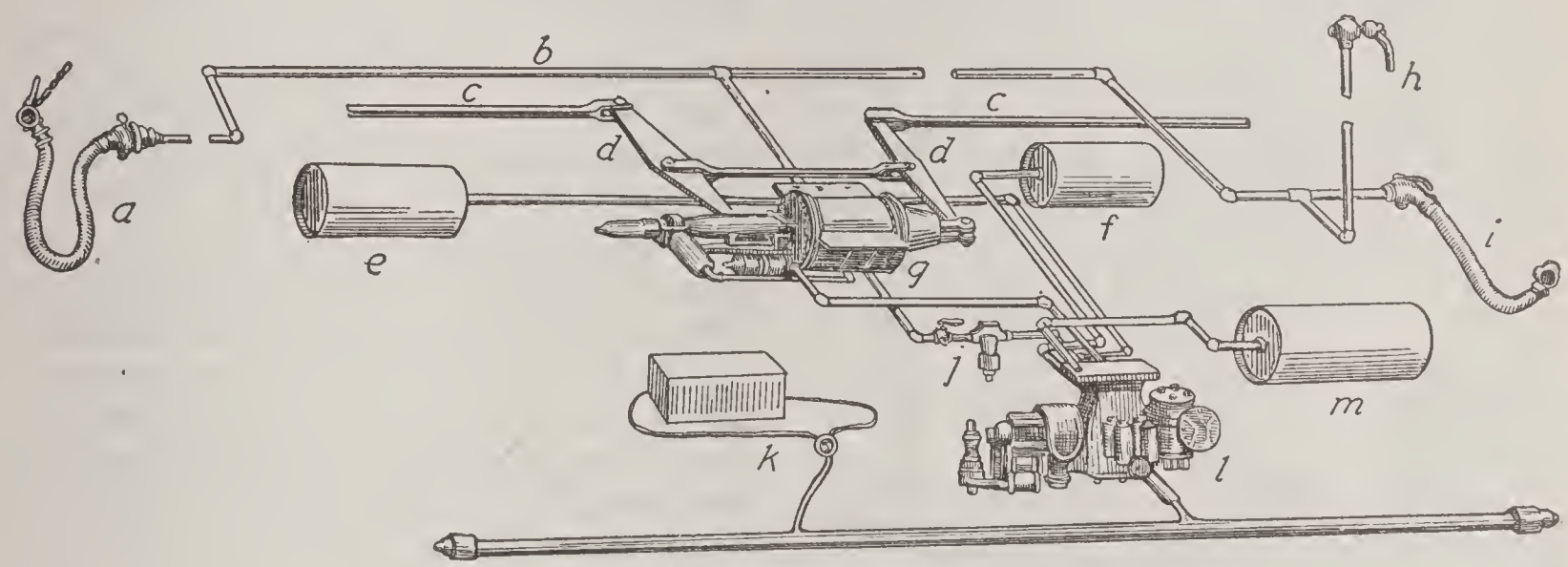
AIR BRAKE, a device which uses the power of compressed air to stop railway trains or regulate their speed. Before the invention of the air brake the only way of bringing a train to a stop was by the hand brake attached to each car. The brakeman had to run from one end of the train to the other, setting each brake as he went. If the train was long, several minutes elapsed before it finally could be brought to a stop. Many accidents occurred because of defective brakes and also because a train could not be stopped quickly.

One of these railroad accidents, which he witnessed, set a certain twenty-year-old youth to thinking. Two years later, in 1868, this youth, George Westinghouse, had perfected a device with which the engineer in his cab, by turning a valve, could stop his train. Westinghouse took his plans to Cornelius Vanderbilt, then the foremost railroad man in the United States; but the old "Commodore" somewhat angrily told him that he had no time to waste

on fools who thought they could "stop trains with wind." Fortunately, however, Andrew Carnegie and several of his friends were willing to bear the expense of an actual test, and in October, 1868, the first train equipped with the Westinghouse air brake ran from Pittsburgh to Steubenville, Ohio, a distance of forty-three miles. The experiment was entirely successful, and proved that a train could be stopped within its own length. The old-fashioned hand brakes are still used in sections where traffic is light and every train has only a few cars, but on all the great railway systems of the world the Westinghouse automatic air brake is used. It has also been adapted for use on electric railways, the power being furnished by an electric motor instead of by a steam engine.

triple valve automatically slides so that the auxiliary reservoir is placed in connection with the brake. If, for any reason, the pressure in the train pipe ceases, the train comes to a stop.

When the engineer wishes to apply the brakes, he throws the handle of the air brake valve to a specified position, thus permitting the air in the train pipe to escape into the open air. The escape of the air lowers the pressure in the train pipe, and the triple valve, responding to the higher pressure in the auxiliary reservoir, slides back, thus opening an aperture through which the air in the auxiliary or car reservoir reaches the brake cylinder. The pressure of the air forces the piston of the brake cylinder forward, and the piston in turn, through proper levers, presses the brake shoes



DETAILS OF AIR BRAKE MECHANISM

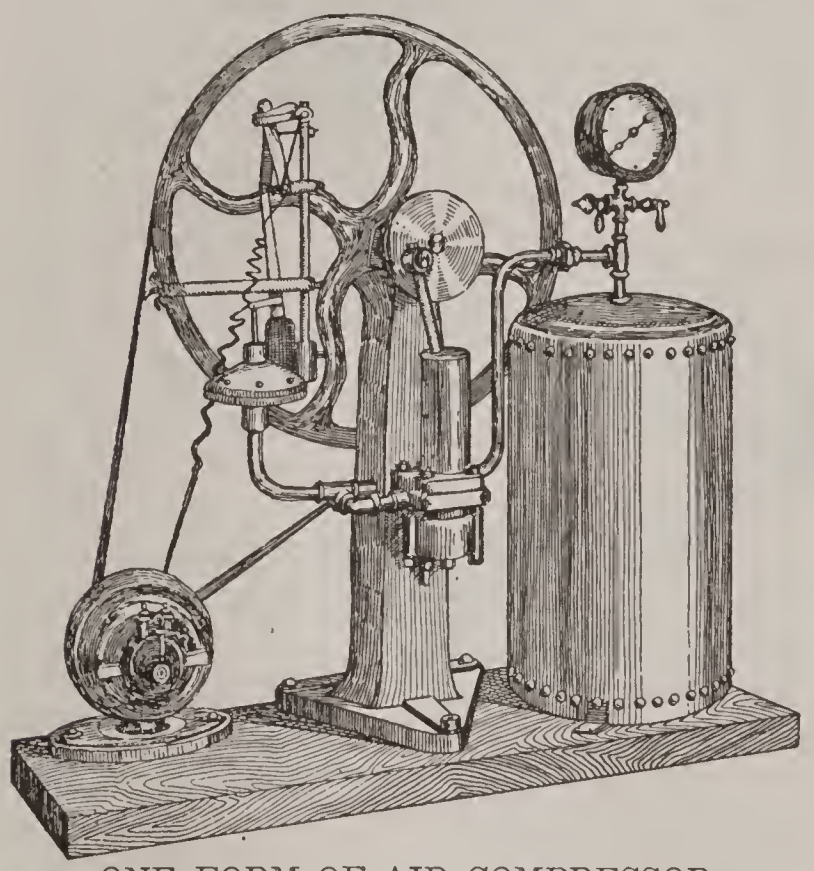
(*a*) Hose and coupling
(*b*) Brake pipe
(*c*) Pull rod to brake beam
(*d*) Cylinder levers
(*e*) Emerging reservoir
(*f*) Service reservoir
(*g*) Brake cylinder
(*h*) Conductor's valve
(*i*) Hose and Coupling
(*j*) Centrifugal dirt collector
(*k*) Battery and switch
(*l*) Universal valve with electric magnet
(*m*) Auxiliary reservoir
(*n*) Train pipe to engineer's cab

Its Operation. The air brake in use to-day is a great improvement over the first one used in 1868, but the principle is the same. Some of the steam in the engine works an air pump, which compresses air in a reservoir under a pressure of eighty to ninety pounds per square inch. From this central reservoir in the locomotive, pipes run under the cars the entire length of the train, the connection between the cars being made by rubber tubing. Attached to the bottom of each car is a secondary or auxiliary reservoir; this receives the compressed air through a device called the *triple valve,* which is the automatic feature of the entire system. So long as the air pressure continues in the train pipe, the triple valve remains in position so that the air pressure is exerted in the auxiliary reservoir but not on the brake; if the pressure is reduced or entirely removed, the against the wheels. When the engineer wishes to release the brakes he turns the valve in the locomotive so that air rushes from the central reservoir through the train pipe. The pressure thus increases on the triple valve, which is forced back, thus opening an aperture through which the compressed air in the brake cylinder escapes into the open air. Inside the cylinder is a coiled spring, which then reacts and forces the brake piston back to its normal position. The brakes are thus released. The valve in the locomotive may be turned so that the brakes operate either slowly or suddenly. See WESTINGHOUSE, GEORGE; LOCOMOTIVE. C.R.M.

AIR CELLS, small cavities, either in plants or animals, which contain only air, and exist for the sake of giving buoyancy. Water plants which float upon the surface, such as water lilies, have them in abundance, and are held up

by them, while certain sea-weeds have actual air-bladders. These last are not *cells* in the technical sense, nor are the so-called air cells in the bodies of birds, which may be inflated when the bird prepares for flight. These enclosed, air-filled areas are most fully developed in birds of strong, powerful flight, such as the albatross.

AIR COMPRES'SOR, a mechanical device for compressing air by forcing it into a receptacle, where it is kept until required for use. The most widely used form of compressor consists of a cylinder, with necessary valves, in



ONE FORM OF AIR COMPRESSOR

which a piston is worked back and forth by steam or other power. The piston sucks air into the cylinder through one set of valves, which close as the piston commences its return stroke. The strokes of the piston compress the air and force it through other valves into a reservoir, or receiver. From the receiver the air is sent through pipes to points at which its power is required. Some appliances are so powerful that the compressed air exerts a pressure of 3,500 pounds per square inch.

Drilling and riveting, in bridge and shipbuilding, are usually performed by tools operated by compressed air, which is also used for pneumatic dispatch tubes, ventilating, rock drilling, air cleaning and many other purposes. A more simple form of air compressor is found in the pumps for forcing air into bicycle and automobile tires. These have a valve in the cylinder to admit air, and a valve through which the air is forced into the tire by the pressure of a piston. See AIR; COMPRESSED AIR; PNEUMATIC TOOLS; AIR BRAKE.

AIR ENGINE, an engine in which heated or compressed air is used as the motive power. A great many engines of this type have been invented, but most of them have been failures. It has been found impossible to get very much power in return for the amount of heat applied, because the expansion of air is so small compared, for instance, with that of water in the form of steam. In the form of motors for producing very small amounts of power, air engines have been found convenient for use on farms, but even here they have proved so inefficient that they are rapidly being replaced by gasoline engines.

The most common and the most effective air engine is the Erickson engine, which burns wood or solid fuel or gas. It consists of a heating chamber surrounding an iron cylinder, with a burner at the bottom, the flames of which play on the bottom of the cylinder. The heating chamber is insulated, and the heat is applied directly to the cylinder itself, to avoid waste. Within this cylinder is a piston, which is alternately lifted and dropped by the heating and cooling of the air. Such an engine is started by giving the wheel a revolution or two by hand in order to lift the piston and thus to drive the cool air to the bottom, where the flame heats and expands it so that it gives the piston another impulse.

The motion of this piston is up and down. It may be connected with a rocker arm which is in turn attached to the crank on a driving shaft, or, if it is used for pumping, the piston in the cylinder may be connected directly with the piston of the pump and the up and down motion transmitted directly to it.

An interesting use of an air engine has been made in some fans which were designed to take the place of electric fans, wherever electricity was not available. Enclosed in the base of the fan is a tiny air engine, exactly similar in principle and construction to a large engine, with an alcohol lamp for furnishing the necessary heat for expanding the air.

The first air engine, invented in 1816 by Rev. R. Stirling, was the subject of two patents, one in 1827 and another in 1840. A double-acting Stirling engine of fifty horsepower was used for some years in a Dundee (Scotland) factory. There is a modern engine, known as Robinson's, which is modeled on the original Stirling engine. In 1833 John Ericsson, later famous as the builder of the *Monitor,* invented an air engine to be used in the ship *Calcoric,* but it did not prove a success.

Engines working by compressed air, which can easily be conveyed long distances, are used in mining and tunneling, and compressed air tools are used in riveting, in drilling and cutting rock, in boring holes in concrete, and in many similar operations, but these do not come strictly under the term air engine and will be found under other headings. See COMPRESSED AIR. C.R.M.

AIR GUN, a weapon designed to project bullets or darts by means of compressed air. The stock contains a chamber into which air is forced by compressing a spring, which works a piston in a cylinder. When the trigger is

AIR GUN
A dangerous weapon used by boys.

pressed, the spring is released and the air is forced into the barrel, propelling the charge in front of it. The force applied by compressed air is far less than that of gunpowder or other explosives, and the range of air guns is correspondingly short.

The so-called toy gun used by boys for target shooting, and sometimes for killing small birds, has a range of not more than 150 feet, and even at that distance cannot be relied on for accuracy. The careless use of these weapons has been the cause of many grave accidents, and, while they are not sufficiently powerful to kill, many boys have suffered the loss of an eye and other injuries through reckless shooting. In most cities the use of air guns is forbidden, and the weapons are liable to confiscation by the police.

AIR PLANTS or **EPIPHYTES,** *ep' i fites.* Most plants send down roots into the ground to draw up food from the soil, but there are some, known as *air plants,* which receive all their nourishment from the air. They fasten themselves upon other plants, but, unlike parasites (which see), they do their hosts no harm. Few, if any, flowering air plants grow in the temperate regions, for there is not to be found there the intense heat and moisture which they must have, but in the jungles of South America, Asia and Africa gorgeous air-fed orchids flourish. Practically the only air plants with which dwellers in temperate regions are familiar are the mosses and lichens.

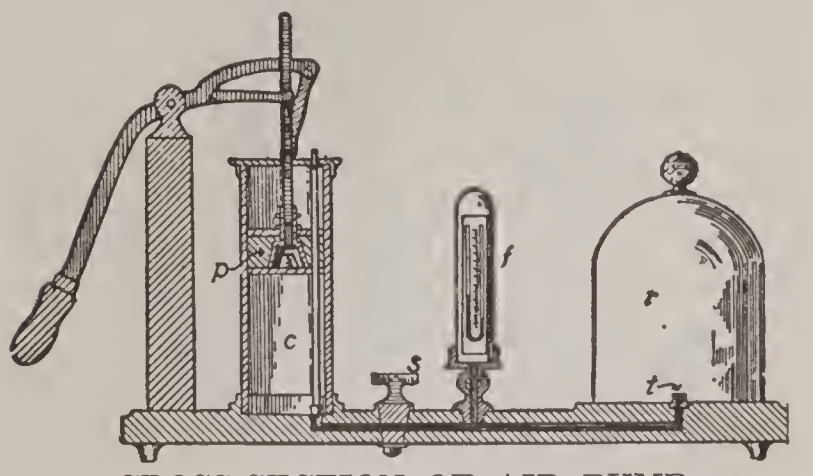
AIR PUMP, a device for exhausting air or other gases from a closed vessel. The air pump designed for use in schools is the form that comes readily to mind when the term is mentioned. The accompanying illustration is one of the many forms used for experimental purposes, and is designed for demonstrating the physical laws governing the pressure of air rather than for practical use in business or industry. The principle governing the operation of all such pumps is the same; a receiver, such as *r* in the illustration, is made air-tight, and the air is pumped out through the tube *t.* A simple arrangement of valves in the pump prevents the air from returning through the tube into the receiver. The ordinary suction pump for raising water from a well is constructed on the same principles as the air pump, and before the water reaches the top of the pipe the air has been exhausted by the pump, which then pumps the water. The vacuum cleaner (which see), is another practical application of the principles of an air pump.

Some Things to Be Learned from It. The air pump may be used in a variety of simple experiments which illustrate some of the principles of physics. For example, if a lighted candle is placed under the receiver, it will go out the moment the air is exhausted, thus illustrating the well-known fact that oxygen is necessary to combustion. If the air is gradually exhausted from a receiver under which a glass of water has been placed, bubbles will begin to rise to the surface of the water, thus showing that the water contains air, which tends to expand and rise as the air pressure in the receiver is gradually decreased. Another simple experiment can be made to show that air is necessary to the spread of sound. The ringing of a bell suspended inside the receiver by a thread can be heard when the receiver is filled with air, but when the air is exhausted no sound is heard. Scientists know, what this simple test proves, that sound is a vibration of the air.

Description of a Simple Air Pump. In order that the operation of an air pump may be understood beyond any possible doubt, the simple form illustrated herewith will be explained in detail. It must not be forgotten that there are several varieties of air pumps, and that the explanation given here would not apply, without slight changes, to any other form. In the illustration *r* is the receiver, which is made to fit closely upon a flat plate, usually of metal. The bottom edge of the receiver is often greased to make an air-tight connection. From *r* a tube, indicated by the letter *t,* leads to a cylinder *c,* in which there is a piston *p.* In the base of the cylinder is a

valve which allows air to escape from the tube *t,* and in the piston is another valve which allows air in the cylinder to escape into the space above the piston.

Raising and lowering the pump-handle has an immediate effect. A down-stroke of the piston closes the valve in the base of the cylinder. The expansive force of the air confined below the piston head opens the valve in the piston, and some of the air escapes to the upper side of the piston. The next up-stroke of the piston closes the cylinder valve, and opens the one in



CROSS-SECTION OF AIR PUMP

the piston. The air which escapes through the piston valve into the space above the piston is forced out through an opening in the top of the cylinder when the piston moves upward. The expansive tendency of the air in the receiver *r* again fills the lower part of the cylinder, and the entire process is then repeated until a partial vacuum is created. A perfect vacuum cannot be obtained by this apparatus because of mechanical imperfections which are unavoidable. But for ordinary experiments the vacuum is so nearly perfect as to cause no difficulties. C.R.M.

AIRSHIP. See FLYING MACHINE.

AISNE, *ane,* a river in the northeastern part of France, which henceforth will be one of the historic streams of Europe. Rising in the Ardennes mountains it flows first north and then almost straight west and joins the Oise River near Compiegne. Its length is about 180 miles, of which nearly 100 miles are navigable. The river Aisne has nearly a parallel course with another historic river, the Marne, (which see), that flows a little distance to the south of it.

Battle of the Aisne. During the War of the Nations two very important battles were fought on its banks. The first, known as the Battle of the Aisne, took place in September, 1914. After the Germans were defeated on the Marne, they retreated across the Aisne and took up positions prepared beforehand. The French and English pursued them, and a series of desperate battles with great losses on both sides took place. No decisive victory was won by either side, and the opposing armies maintained their positions and began to dig themselves into a series of fortified trenches. It was after the battle of the Aisne that trench warfare started, which became such a characteristic feature of the War of the Nations.

The second battle on the Aisne took place in January, 1915. It began with a great offensive movement by the French, who succeeded in crossing the river at Soissons. They occupied some ground held by the Germans, but after desperate battles lasting five days they were compelled to retire across the river to their old positions. See WAR OF THE NATIONS.

AIX, *ayks,* a city of France, in the department of Bouches-du-Rhone, eighteen miles by rail north of Marseilles. It contains the faculties of letters and law of the University of Aix-Marseilles, and for this reason some quarters of the town have the aspect of the famous Latin Quarter of Paris. Aix is the seat of a Roman Catholic archbishop, and it has an interesting cathedral in Gothic style, dating from the twelfth century. There are here a number of warm springs, containing lime and carbonic acid, which have been used since the Roman period. Population, about 9,000.

Aix was founded in 123 B. C. by the Romans, who named it *Aquae Sextiae.* It was near this place that Marius gained in 102 B. C. his famous victory against the Cimbri and Teutons. During the Middle Ages Aix was the capital of an independent county of Provence and became an important seat of learning and a brilliant artistic center. The town began to lose its importance when Provence was passed under the crown of the kings of France in 1487.

AIX–LA-CHAPELLE, *ayx lah sha pel',* since 1815 officially but not popularly known as AACHEN, is a city of Rhenish Prussia, 44 miles southwest of Cologne. The most important building is the cathedral, the oldest portion of which was erected in the time of Charlemagne, as the palace chapel, about 796. This place was the favorite residence of Charlemagne, who died in 814, and was here buried. A gold coffin in the cathedral contains his remains. Thirty-seven German emperors and eleven empresses have been crowned in the city, and the imperial insignia were preserved here till 1795, when they were carried to Berlin and placed in the imperial treasury.

There are a number of warm sulphur springs in and near the city, one having a temperature of 140°, and several mineral springs which have

a world-wide reputation for curing rheumatism. Aix-la-Chapelle is an important commercial center; the chief manufactures are needles, cloth, gloves, leather, chemicals, linen and paints. Two celebrated treaties were signed in Aix-la-Chapelle, and a congress of the great powers was held there in 1818. On the outbreak of the War of the Nations in 1914 the city became an important German military center, and vast armies were sent from there to take part in the invasion of France which the allies succeeded in checking. Population in 1919, 145,748.

Congress of Aix-la-Chapelle, a meeting of representatives of the great nations of Europe, held at Aix-la-Chapelle in 1818, for the purpose of adjusting the affairs of Europe after the wars of Napoleon. This was not, however, the authority which banished Napoleon to Saint Helena. Czar Alexander I of Russia, Emperor Francis I of Austria, and King Frederick William III of Prussia were present in person, while among the great statesmen in attendance were Metternich, Castlereagh, Wellington, Hardenberg and Richelieu, the grandson of the great cardinal. The main things accomplished were the withdrawal of the foreign troops from France and the recognition of France as one of the great powers of Europe on her agreeing to the Holy Alliance. See FRANCE, subhead *History;* HOLY ALLIANCE.

Treaties of Aix-la-Chapelle, two treaties of importance in maintaining the balance of power among European nations. After the death of Philip IV of Spain, Louis XIV of France claimed a large part of the Spanish Netherlands in behalf of his wife, and seized the fortresses of Charlerois, Lille and Franche Comte. Holland, to protect herself against further aggressions, joined England and Sweden in forming the Triple Alliance. Fearing such a strong combination, Louis was forced to accept their terms, and on May 2, 1668, he signed the first treaty of Aix-la-Chapelle, by which he agreed to return Franche Comte to Spain.

The second treaty concluded the War of the Austrian Succession in 1748 (see SUCCESSION WARS). In this war, caused by Maria Theresa's claim to the Austrian possessions, all of the great powers of Europe were involved. By the terms of the treaty, the different countries held nearly the same territories as before.

AJACCIO, *a yah' cho,* the capital of Corsica, famed as the birthplace of Napoleon. The house in which "the little Corsican" was born is still well preserved and is owned by the French government. Ajaccio is the seat of a bishop. It has famous coral and sardine fisheries. The population is not increasing; in 1911 it was 19,227.

A'JAX. Two of the legendary Grecian heroes in the Trojan War were named Ajax. The son of Telamon, king of Cyprus, was known as the Greater or the Telamonian Ajax, and the son of Oileus, the king of Locris, was called the Lesser or the Locrian Ajax. The Greater was the commander of twelve ships and was called by Homer the bravest of the Greeks except Achilles. In the combat between Ulysses and Ajax for the arms of Achilles after the latter's death, the prize was awarded to Ulysses. The disappointment of Ajax drove him mad, and after slaying all of the sheep of the Greeks, thinking they were the enemy, he killed himself.

The boastful and quarrelsome Ajax the Lesser was a rival of Achilles in swiftness of foot. As a punishment for his brutal treatment of Cassandra after the fall of Troy, it is said that his ship was wrecked and he was struck by lightning. (See TROY).

A KEMPIS, THOMAS. See THOMAS A KEMPIS.

AK'RON, OHIO, the largest rubber manufacturing city in the world, is the county seat of Summit County, in the northeastern part of the state. The population was 69,067 in 1910; in 1920, according to the new census taken in January, it had reached metropolitan proportions and numbered 208,435, a gain of nearly 202 per cent in ten years. About twenty-five per cent of the people are foreign born, Hungarians predominating. The area of the city is nearly twelve square miles. Cleveland and Toledo, both on Lake Erie, are respectively thirty-five and 160 miles north and northwest. Columbus, the state capital, is 130 miles southwest. Akron is a Greek word meaning *height,* indicating the elevation of the city, which is 1,000 feet above sea level. Within a radius of twelve square miles are twenty small lakes, giving to the region great natural beauty and an excellent location for its many hotels and recreation places.

Akron is on the Little Cuyahoga River and the Ohio Canal. The Erie, the Baltimore and Ohio, the Pennsylvania, the Northern Ohio, and the Akron, Canton and Youngstown railroads enter the city. Interurban lines run to many of the surrounding towns and cities. Conspicuous among the many fine buildings of

the city, including banks, churches, schools, hotels, etc., is the postoffice, erected in 1890 at a cost of nearly $100,000; the county courthouse, costing about $450,000, and the new $150,000 auditorium-armory. Akron is the seat of Buchtel College, a non-sectarian school formerly under Universalist control. The corner stone was laid by Horace Greeley in 1872. This college and a normal school, with the public school system, offer good educational advantages.

Industries. The output of rubber goods manufactured in Akron in 1915 was valued at $125,000,000. Twenty plants making automobile tires and every kind of rubber goods employ 30,000 workers. Beds of fire and pottery clay near the city furnish raw material for one of the largest industries, including manufactories of pottery, tile and terra-cotta. Among a great number of other important manufacturing industries are printing, publishing and lithographing works, hoisting and mining-machinery works, manufactories of farm implements and of furnaces. In the suburb Barberton is the largest match-making concern in the world.

History. A small settlement on the banks of the Cuyahoga River received the name of Akron in 1825. The place was incorporated as a village in 1836 and received a city charter in 1865. Two of the most important historical features are the old Indian trail, Portage Path, once a part of the western boundary of the United States, between the Cuyahoga and Tuscarawas rivers, and the one-time residence of John Brown, the abolitionist. v.s.s.

ALABAM'A, popularly called the COTTON STATE, one of the Southern states of the American Union. *Alabama* is said by some authorities to be the Creek Indian word for *here we rest,* or *place of rest,* but it is probably another form of *Alibamu,* the name of a tribe of Creek Indians who once inhabited part of the present state. Alabama was admitted to the Union on December 14, 1819, being the ninth state organized after the adoption of the Constitution. At that time its area, 51,998 square miles, was exceeded only by three states, but since the admission of the larger Western states it ranks twenty-seventh in size. It has about one-fourth the area of France or the German Empire, and is equal to Maine, New Hampshire and Vermont combined. Its population in 1920 was 2,348,295, making it the eighteenth state in this respect. In the same year the city of Chicago had more than a third of a million more people.

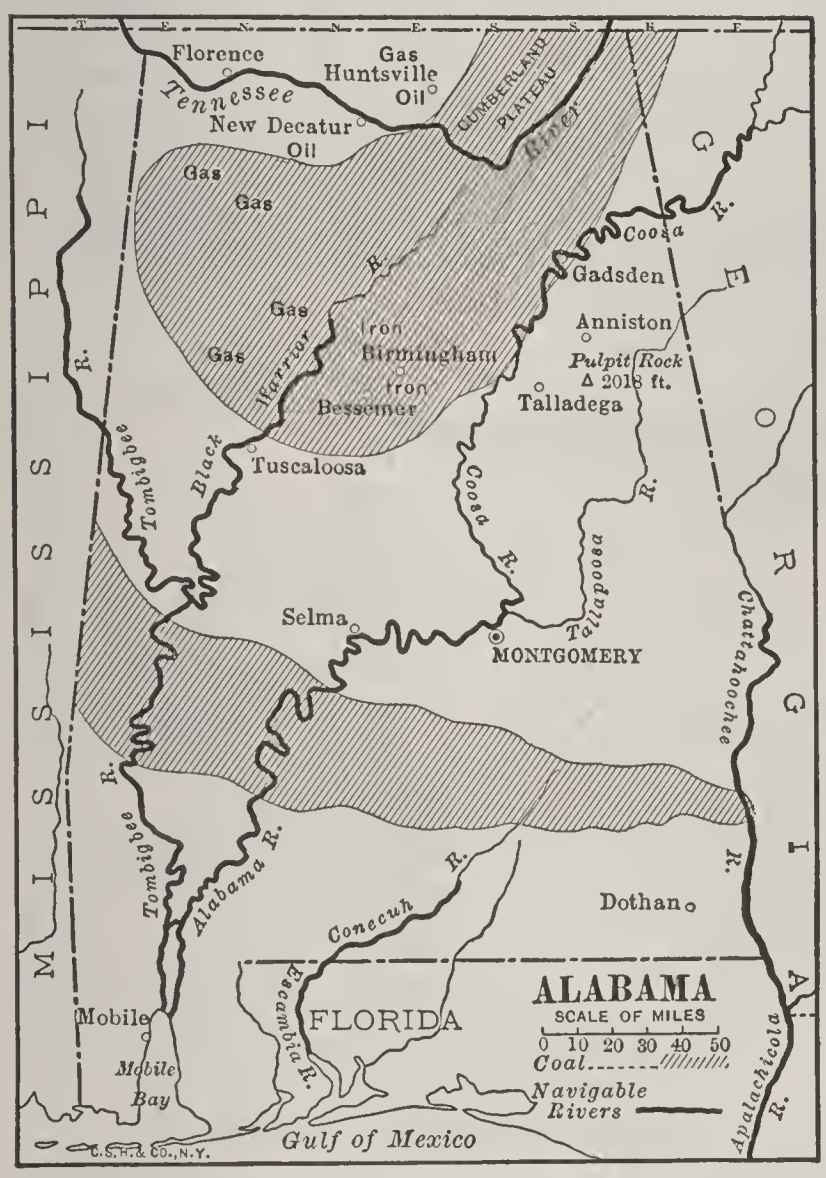
Location and Physical Characteristics. Alabama is really the central one of the Southern states east of the Mississippi River. Between it and the Atlantic Ocean lies Georgia; on the west Mississippi stretches between it and the great central river. On the north is the border state of Tennessee, separated from Alabama by the parallel of 35° N., which is also the approximate latitude of Los Angeles, Yokohama and Algiers. On the south, except for a strip fifty miles long which touches the Gulf of Mexico, Alabama is bounded by Florida.

Alabama has the physical characteristics of the Atlantic coast states. Like them, it may be divided into three sections, according to surface—the coastal plain, the Piedmont region and the mountains. The Appalachian chain has its southern extremity in the north and east-central part of the state, where it dwindles into several parallel ranges of flat-topped hills which nowhere exceed 1,800 feet in height. The most prominent are Raccoon and Lookout mountains, which follow the southwest trend of the Appalachian chain. It was on the northern end of Lookout Mountain, in Tennessee, that one of the great battles of the War of Secession was fought. Southeast of the mountains is the main Appalachian valley, here known as the Coosa. The section is drained by the Coosa River, whose waters eventually find their way through the Alabama and Mobile rivers into the Gulf of Mexico.

North and west of the Appalachian region is the Cumberland Plateau, whose central feature is the valley of the Tennessee River. The valley itself includes a broad strip of rolling lowlands, well adapted for farming, but on both

sides are rocky tablelands separated by deep river valleys. To the southeast of the Appalachian valley is the Piedmont region, drained chiefly by the Tallapoosa, which unites the Coosa to form the Alabama River. Ages ago the Piedmont section was worn down by erosion almost to sea level, and then by a great natural change was uplifted to form a plateau (see PIEDMONT REGION).

This varied northern section, including mountains, plateaus and many valleys, comprises



ALABAMA

Map shows boundaries, locates the highest point of land in the state, the principal cities, rivers, and sections where coal is found.

only two-fifths of the state; the remaining three-fifths belong to the coastal plain. In the central part of the state the plain has an altitude of 600 to 700 feet, but it gradually slopes to the southwest, until in the vicinity of Mobile it is practically at sea level. It is not entirely flat, however, for at irregular intervals are limestone ridges, sometimes ten or twelve miles wide. Here the rains and rivers have washed away the surface sands and clays. The plain has several belts of yellow pine and other woods, which supply not only lumber but tar, turpentine and resin.

In all parts of the state, but especially in the mountains and the Piedmont region, the climate is delightful. Extremes of temperature are unusual, as the prevailing winds from the south and southeast are cooled in summer and warmed in winter by their passage over the Gulf of Mexico. The lowest temperature ever recorded in the state was —17° F., in 1899, and the highest was 109°, in 1902. The mean temperature for the state is 42° in January and 84° in July. Snow falls occasionally in the north, and perhaps once during the winter on the coastal plain. The rainfall is everywhere abundant, ranging from an average of fifty-two inches a year in the north to sixty-two inches in the south.

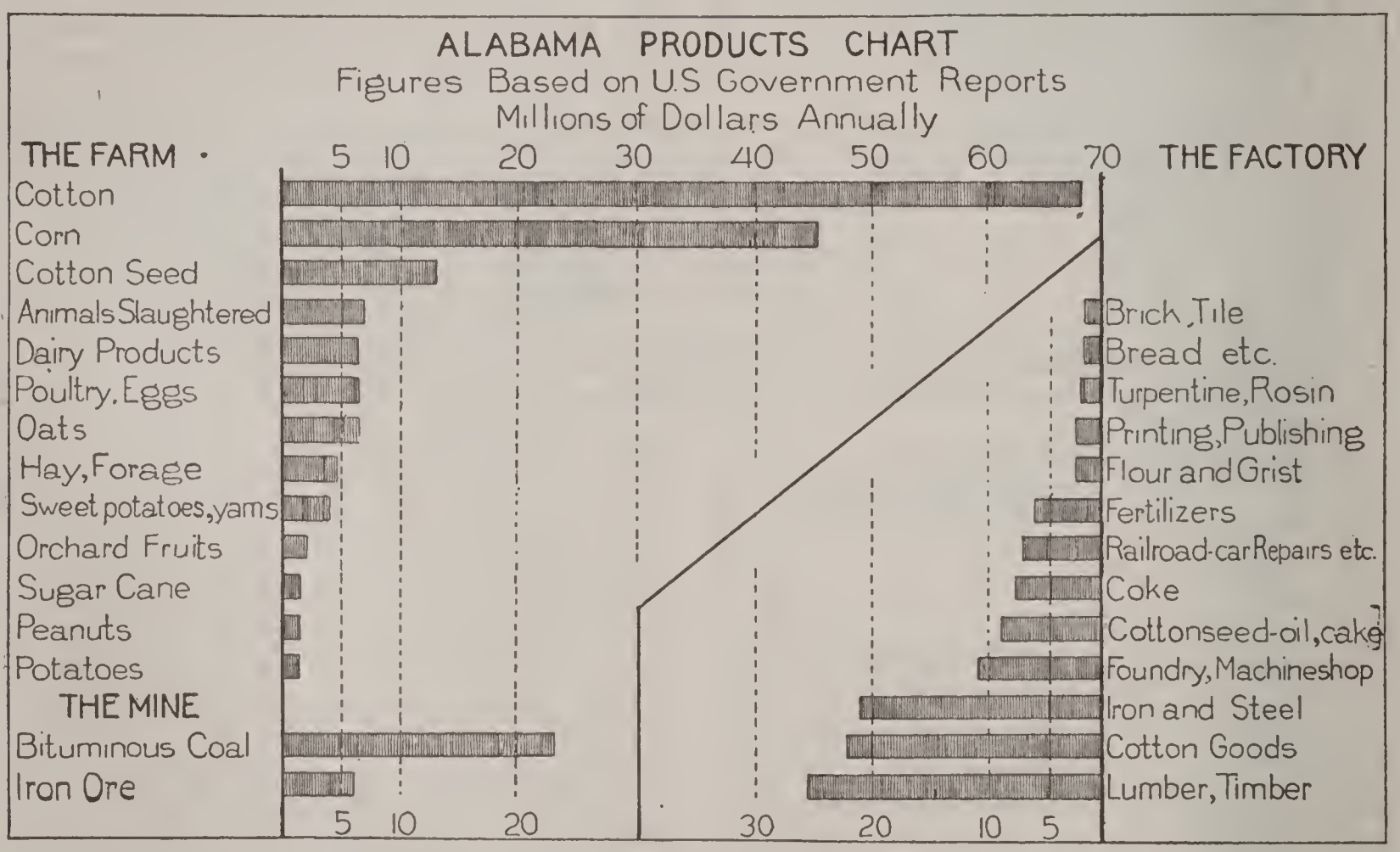
Agriculture. Alabama is primarily an agricultural state. More than three-fifths of the total area is occupied by farms, and a slightly larger percentage of the people make farming their occupation. Through the central part of the state, as also in Georgia and Mississippi, runs a belt of rich black soil containing considerable lime. This is the "cotton belt," with its center at Montgomery. For many years Alabama has produced more than 1,000,000 bales (about 240,000 tons) of cotton annually, and sometimes its crop is nearly 2,000,000 bales. The value of the crop ranges between $50,000,000 and $100,000,000, giving the state usually third or fourth rank among cotton producers. Not long ago cotton and cotton seed were worth nearly twice the total of all other crops, but now they are almost rivalled in importance by the cereals, of which corn is the foremost. About 60,000,000 bushels of corn and 10,000,000 bushels of oats are produced, but the wheat crop seldom reaches 1,000,000 bushels. Cereals are raised chiefly in the Piedmont region and in the Tennessee valley, where the soil is a rich red or yellow loam. Here melons, apples, peaches, strawberries and other fruits are also grown, and in the south the cultivation of figs and pecan nuts flourishes. Sweet potatoes, sugar cane and peanuts are important.

Mining and Manufactures. Though Alabama is still mainly an agricultural state, the most striking feature of its growth since the War of Secession is the unparalleled development of its mineral resources, followed by the introduction of manufacturing on a large scale. The northeastern part of the state, and the central part as far south as a line from Tuscaloosa to Columbus, Ga., is rich in iron and coal deposits, and also has asbestos, limestone, graphite, bauxite and petroleum in paying quantities. Though the existence of large mineral deposits has been known for many years,

mining has become a great industry only since 1900. In 1886 about $2,500,000 worth of bituminous coal was produced; in 1898 about $5,000,000; and at present over $20,000,000 each year. The annual output is about 15,000,000 tons, making the state among the first seven in rank in the Union; this amount is slightly more than the average annual production in the Dominion of Canada. About one-third of the coal mined is immediately made into coke, in the production of which Alabama is exceeded only by Pennsylvania. Over seventy-five per cent of the coal mined is taken from three counties—Bibb, Jefferson and Walker—but the coal-bearing formations cover more than a third of the northern half of the state.

1880 to an annual average of more than $200,000,000. Of this total the allied iron and steel industries produce one-fourth, making them by far the most important group. Cotton products, including cottonseed oil and cake, have an annual total of about $35,000,000. Cotton, instead of being sent to the North and to England for manufacture, is now used extensively in home factories. The most important single industry is the making of lumber and timber products, whose value approaches $30,000,000 a year. Thus each of the three great groups of manufactures is based on one of the home industries which produce raw materials—mining, agriculture and lumbering.

Transportation and Commerce. The state



Fortunately for the industrial prosperity of the state, these great coal deposits are in close proximity to the greatest beds of iron ore, except those in Minnesota and Michigan, which have yet been found in the United States. The annual production of iron ore is now about ten per cent of the total for the United States, and the output of pig iron is worth about $25,000,000 a year, or five per cent of the total for the United States. Much of the ore is still shipped to other states for smelting, but this proportion is steadily decreasing.

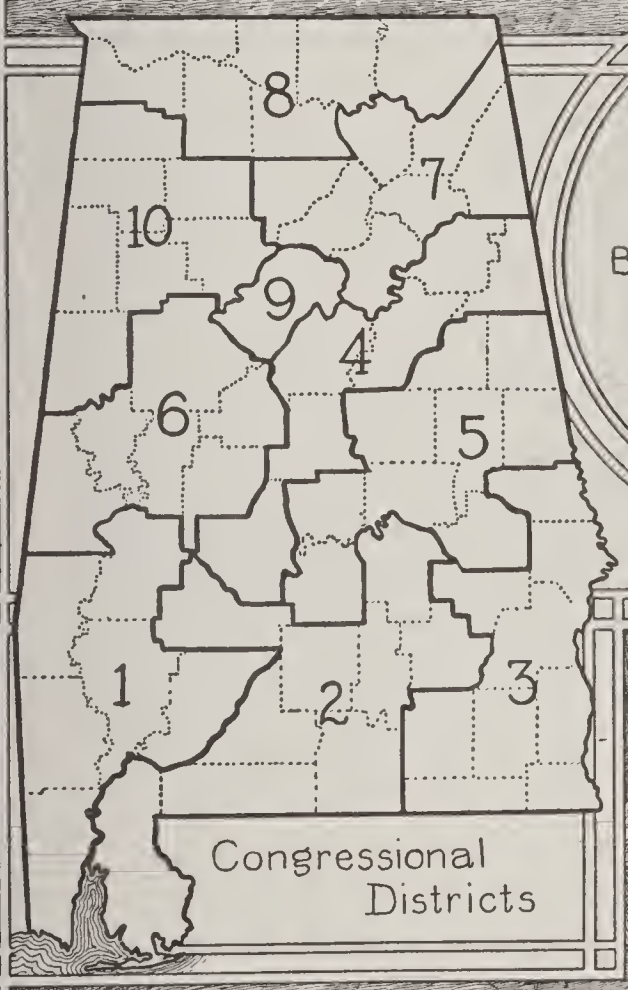
It is due to coal and iron that Alabama, and especially the northern section, has become a manufacturing community, with a product whose value has increased from $14,000,000 in

is fortunate in that nearly all of the rivers are navigable for most of the year. Its mileage of navigable waterways is greater than that of any other Southern state; the Alabama is navigable for 300 miles, and the Tombigbee for about 350 miles. In the north, that part of the Tennessee River lying within the state is navigable except near Florence, where a canal has been built around the Mussel Shoals. Mobile is the only seaport of importance, and is the center for the state's export trade in cotton and lumber, but much lumber is also sent to Pensacola and a great deal of cotton to New Orleans.

The railroad mileage is now over 5,500, an average of one mile to every 400 of population and to 9.5 square miles of area. All of

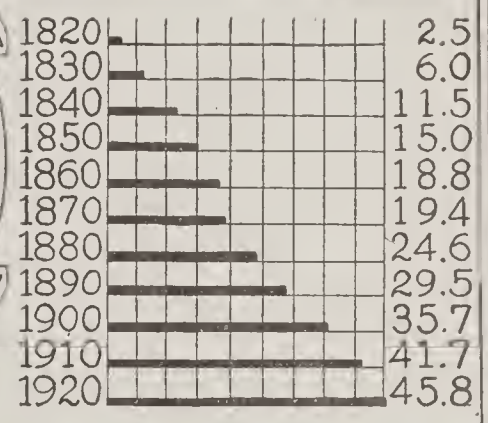
ALABAMA

State Capitol



Congressional Districts

Religions



People per square mile, by decades

Interior of coal mine

the great railway systems of the South tap the mineral regions of the northern part—the Southern, the Mobile and Ohio, the Louisville and Nashville, the 'Frisco lines, the Seaboard Air Line, the Atlantic Coast Line and the Central Railroad of Georgia. Through these systems the state has connection with the great trunk lines of the north and west.

The People. Since its admission to the Union the population of Alabama has increased steadily, but not rapidly. From 127,900 in 1820 it increased to 309,000 in 1830 and 590,000 in 1840. Thereafter the average increase was about twenty per cent every ten years, bringing the total to 2,138,093 in 1910. Of this total 132,600, or 6.2 per cent, lived in Birmingham, a city which owes its existence to the iron and steel industry. Over eighty per cent of the people, however, live in rural districts, only thirteen cities having more than 5,000 people. After Birmingham, the largest cities, in order, are Mobile, Montgomery, Selma, Anniston, Bessemer and Gadsden.

Alabama has a large number of negro inhabitants; in 1910 the percentage was 42.5 as compared with 45.2 in 1900. The further development of the great industrial region surrounding Birmingham is bound to lower this percentage still more, for the mills and factories are drawing white people from other states. Alabama has long been notable because it has few foreign-born citizens, but in the decade from 1900 to 1910 their number increased from 14,300 to 51,370. This was partly due to the opportunities offered in factories, but also to those in farming. Germans, English, Irish, Italians, Scotch, Russians and Canadians are the most numerous.

Education. The first constitution of Alabama, adopted in 1819, declared that "schools, and the means of education, shall be forever encouraged in this state." This declaration was not put fully into effect at once. For more than twenty-five years the only public schools in the state were in Mobile, and it may safely be said that until after the War of Secession there were no free public schools. Even those schools to which the state contributed were supported in part by tuition, and as late as 1872 it was estimated that one-third of all money received by the schools came from private gifts or subscriptions.

Since 1875, when a new constitution was adopted, the public school system has made rapid progress. The permanent school fund, derived chiefly from the sale of lands donated by Congress, now amounts to more than $2,000,000. There is also an annual state tax of thirty cents per $100 for school purposes, and certain license and other fees are also devoted to the same end. All state funds are apportioned among the counties according to the number of children between the ages of seven and twenty-one. Of the children between those ages a few more than half attend school. About twenty-two per cent of the total population and more than fifty per cent of the negroes are illiterate (see ILLITERACY).

Secondary and Higher Education. A state law of 1907 permits the establishment of at least one high school in every county, but the operation of the law depends on the governor—whenever, in his judgment, the condition of the treasury permits. There are six state normal schools for whites, at Florence, Troy, Jacksonville, Daphne, Livingston and Moundville. At Montgomery is a state normal for negroes. The state also maintains schools for deaf, dumb and blind children, all at Talladega, the Alabama Polytechnic Institute at Auburn, and nine agricultural high schools (one in each Congressional district) which are preparatory schools for the University of Alabama (which see). Besides the state university there are a number of private institutions for higher education, including Southern University, at Greensboro, and Birmingham College at Birmingham, both supported by the Methodist Episcopal Church, South; Saint Bernard College at Saint Bernard and Spring Hill College at Spring Hill, both Roman Catholic; Judson College for women at Marion and Howard College for men at East Lake, both Baptist; Alabama Synodical College for women (Presbyterian) at Talladega; and Tuscaloosa Female College (Methodist Episcopal Church, South) at Tuscaloosa. Perhaps the most famous school in the state is the Tuskegee Normal and Industrial Institute (which see).

Government. Alabama has been governed under five constitutions. The one now in force, adopted in 1901, provides an executive department consisting of a governor, lieutenant-governor, attorney-general, secretary of state, state auditor, state treasurer, commissioner of agriculture and industries, and superintendent of education. Each of these officers is elected for four years and is not eligible for reëlection. The governor is not eligible by appointment or election to any office in the state or to the United States Senate during his term of office or within one year of its expiration. The

governor may veto any bill passed by the legislature, but if he fails to do so within one week after it has been submitted for his approval it automatically becomes a law. The legislature may pass a bill over the governor's veto by a two-thirds vote. Members of the legislature, which is composed of two houses, are also elected for four-year terms. The senate may not exceed in number one-third of the members of the house; the latter has 107 members and the former thirty-five. The judicial power is vested in the supreme court, a court of appeals, circuit courts, chancery and probate courts, and various local courts. The senate may sit as a high court of justice for the impeachment of any state officer.

The unit of local government is the county, but cities may be chartered in various classes according to their population. In the first class, over 100,000, the commission form of government is required; it is optional for cities between 50,000 and 100,000, but required for cities between 25,000 and 50,000. Birmingham is the only city in the first class, Mobile in the second and Montgomery in the third. Mobile and a number of other cities, including Talladega, Tuscaloosa, Florence and Huntsville, have adopted this system (see COMMISSION FORM OF GOVERNMENT).

Suffrage in Alabama is restricted by the constitution to those who can read and write any article of the Constitution of the United States, have worked or been regularly engaged in some lawful business or occupation for the greater part of the year preceding the date of registration, or who own and have paid taxes on property valued at $300 or more. Permitted exceptions are those persons who are physically unable to read, write or work, and those who have served in the army or navy of the United States or of the Confederate States, in war time, and their lawful descendants.

History. The first white men positively known to have visited Alabama were Spaniards led by De Soto, who journeyed along the Alabama River and its tributaries in 1539 (see DE SOTO, FERNANDO). The English also claimed this region, but no attempts at settlement were made until 1702, when the French soldier-explorer Iberville founded Fort Louis, on the Mobile River. In 1711 the river floods forced the removal of the settlement to a point twenty miles farther south, on the present site of Mobile. Fort Conde, as it was then called, was the nucleus of the first permanent settlement in Alabama.

When the French colonial empire was transferred to England in 1763, Southern Alabama became a part of West Florida, and Northern Alabama was included in the Illinois country, then set aside for the Indians. In 1783, at the close of the Revolutionary War, England ceded the Illinois country to the United States by the treaty of Paris, at the same time giving West Florida to Spain. The boundaries between these sections were already uncertain, and remained in dispute until 1812, when Congress annexed the Mobile Bay district. In 1813 American soldiers took possession of this territory, and thus for the first time gave the United States actual jurisdiction over the entire area now included in the state. For several years the settlers were in constant danger from the Creek Indians, who went on the warpath to help the British, and at Fort Mims, in 1813, several hundred settlers were massacred. In the next year, however, the power of the Creeks was broken and most of their land claims were turned over to the United States. Thus by 1817 it seemed desirable to make Alabama, which had formerly been a part of Mississippi, a separate government; it was therefore made Alabama Territory, and on December 14, 1819, was formally admitted to the Union as the twenty-second state. The years of statehood fall naturally into three periods: (1) before the War of Secession; (2) war and reconstruction; (3) a new era of industrial growth.

Before the War. The first half century of statehood was a prosperous period. Unfortunately, however, this prosperity was founded only on cotton, and the cotton crop was the product of slave labor. The people of Alabama, as a whole, favored the extension of slavery into the territories, and in 1848 the ardent supporters of state's rights, led by William L. Yancey, secured the adoption of the "Alabama Platform," in which the Democratic state convention declared that neither the United States government nor any territory possessed the right to interfere with slavery in a territory. The institution of slavery, accordingly, could be only under state control. The Compromise of 1850 inaugurated a decade of bitter political discussion, which came to an end only with secession and war.

War and Reconstruction. Even after the election of Lincoln, there was in Alabama a strong minority opposed to secession. The legislature, however, had voted to call a special state convention in the event of a Republican

victory, and Governor Andrew Moore, following these instructions, called the convention to meet on January 7, 1861, and on January 11 an ordinance of secession was adopted. The convention also invited the other Southern states to send delegates to Montgomery for the purpose of "securing concerted and harmonious action in whatever measures may be deemed most desirable for the common peace and security." On February 8 a temporary organization was completed by this new convention, and the Confederacy came into official existence (see CONFEDERATE STATES OF AMERICA). During the war Alabama suffered little material damage, but practically the entire body of white men was in the army. In 1863 the Union forces secured the control of a small section in the northern part, and in 1864 Mobile was bombarded. On the whole, however, the state was spared the ruin which war spread over Tennessee and Georgia.

But if Alabama was spared in war, it suffered after peace was declared. Under President Johnson's reconstruction policy, a provisional government was at once organized, but was supplanted in 1867 by a military government under the congressional plan (see RECONSTRUCTION). With the support of the soldiers, the negroes and carpetbaggers controlled the state government until 1874, except from 1870 to 1872. In seven years the state debt was increased from $8,000,000 to over $25,000,000, practically all of the increase being spent wastefully. In 1874 the Conservative Democrats succeeded in electing all the state officials and began a thorough reform. The state debt was compromised to $15,000,000, the carpetbaggers were driven from minor offices and a new constitution was adopted in 1875 (see CARPETBAGGERS).

A New Era. The end of reconstruction was the beginning of a new prosperity for Alabama. The agricultural districts gradually readjusted themselves to the new conditions and made steady progress. In the north the founding of Birmingham in 1871 was followed by the development of the surrounding region. Coal had been discovered as early as 1834, but not until the last two decades of the nineteenth century was it extensively mined. Blast furnaces were erected and Birmingham by 1895 was one of the world's greatest centers of pig-iron manufacture. The first coke furnaces were erected in 1881, and the first steel mills in 1897. This development of manufactures has sometimes seemed to injure agricultural development, notably for a few years after 1890, when the Populists, with the aid of the Republicans, nearly carried the state.

Since 1900, Alabama, like many other states, has been visited by a wave of prohibition sentiment, which reached the high-water mark in 1908, when the legislature passed a state-wide prohibition act. This has been called "the most drastic prohibition act ever passed by any state"; it was bitterly fought, but in 1909 a prohibition amendment to the constitution was defeated by a large majority. This reaction was followed in 1911 by the adoption of a local option system in which the county is the unit. Finally, in 1915, the legislature adopted a state-wide prohibition law which went into effect on June 30, 1915.

Other Items of Interest. Alabama may be broadly divided into four great production regions. Farthest north is the cereal region, which includes the Tennessee valley and the land to the northward; next is the mineral region; then comes the cotton belt or black belt with its rich black soil; and finally, along the Gulf of Mexico and extending inward for 150 miles, is the timber belt with its poor and sandy soil.

The turtle is called the "Alabama gopher."

It was in Alabama that Aaron Burr's final arrest for treason occurred.

Alabama has had four capitals. In 1817, when the territory was organized, the capital was located at Saint Stephens. Three years later it was removed to Cahaba, and in 1826 to Tuscaloosa. Not until 1846 was it permanently located at Montgomery.

The "peonage" cases occurred not only in Alabama, but in other states of the South as well, and it is only because they first came to light there that they are more intimately connected with the history of that state. See PEONAGE.

The highest point in the state is Mount Cheaha, 2,407 feet above sea level.

The first discovery of coal in Alabama was made in 1834.

The clause which excepts from suffrage restrictions the descendants of those who have served in time of war in the United States or the Confederate army is known as the "Grandfather Clause." See GRANDFATHER CLAUSE.

Birmingham is known as the "Pittsburgh of the South."

Perdido Bay, at the boundary line between Alabama and Florida, was formerly the resort of pirates and filibusters.

Even the fertile "cotton belt" land has shown signs of exhaustion, so constant has been the raising of cotton; and alfalfa and cow-peas have been grown of late years over wide areas, to enrich the soil.

Many of the negroes who are serving long terms in the penitentiary are employed in mining coal.

Montgomery was the first capital of the Confederate states.

Alabama was one of the very early states to introduce railways, indeed, it had the first railroad west of the Alleghanies—a forty-mile line connecting the town at either end of the Muscle Shoals. To-day this would scarcely be considered worthy the name railroad, as its rails were of bar iron and its trains were drawn by mules. W.F.Z.

Consult *Alabama,* in the American Commonwealths Series; Brown's *School History of Alabama.*

Related Subjects. The above article confines itself to general description. A more detailed knowledge of the geography of Alabama may be gained from a study of the following articles:

CITIES AND TOWNS

Anniston	Mobile
Bessemer	Montgomery
Birmingham	Selma
Florence	Talladega
Gadsden	Tuscaloosa
Huntsville	

COAST WATERS

Gulf of Mexico	Mobile Bay

EDUCATION

Alabama, University of
Tuskegee Normal and Industrial Institute

HISTORY

Carpetbaggers	Local Option
DeSoto, Fernando	Prohibition
Fort Mims, Massacre of	Reconstruction

LEADING PRODUCTS

Coal	Iron
Coke	Lumber
Corn	Sugar Cane
Cotton	

RIVERS

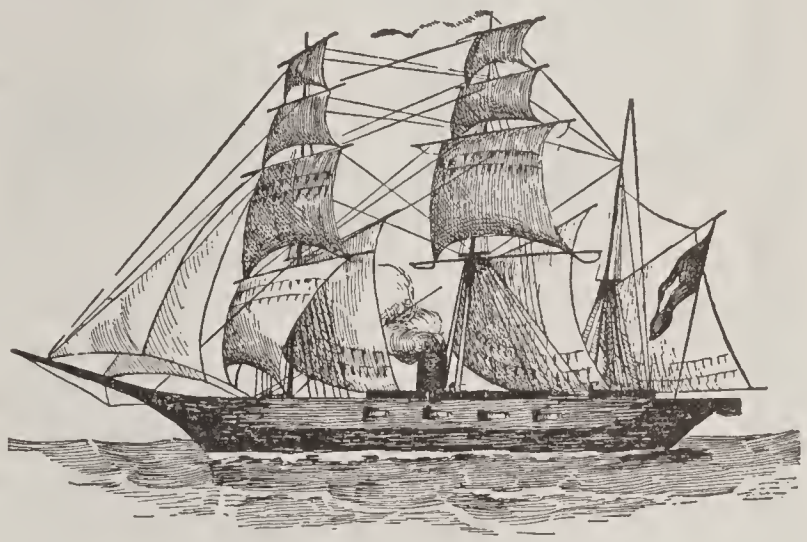
Alabama	Mobile
Chattahoochee	Tennessee
Coosa	Tombigbee

SURFACE FEATURES

Appalachian Mountains	Cumberland Mountains
Coastal Plain	Piedmont Region

ALABAMA, a river of Alabama which flows through the most fertile farm lands and the richest forests of the state. It is formed by the junction of the Coosa and the Tallapoosa rivers six miles north of Montgomery, in the central part of the state. From Montgomery it follows a winding southwesterly course to a point about fifty miles north of Mobile, where it unites with the Tombigbee to form the Mobile River. It is navigable from its mouth to Montgomery, a distance of 320 miles. In earlier days the river was the chief commerce carrier of the state, a large part of whose products were sent to Mobile for shipment, and in spite of the more recent development of railways it still carries extensive traffic in cotton, wheat, oats and other products of the section.

ALABAMA, The, the most destructive and consequently the most famous of the Confederate privateers which preyed on Federal merchant vessels during the War of Secession. The *Alabama* was built at Birkenhead, Eng-



THE FAMOUS "ALABAMA"

land, in 1862, under circumstances so suspicious that the United States minister, Charles Francis Adams, called the British government's attention to the vessel. Contrary to international law and Queen Victoria's proclamation of neutrality, it was allowed to sail, and made its way to the Azores Islands, where it took on guns and stores from another vessel. Captain Raphael Semmes, who named the vessel, took command on August 24, 1862, and for two years made his name and the name of his ship the terror of Federal merchantmen. In two years the *Alabama* captured sixty-five ships, and destroyed property valued at $4,000,000. For two years Federal cruisers sought for the *Alabama* on all seas, and finally on June 11, 1864, it was compelled to take refuge in the harbor of Cherbourg, France. The United States *Kearsage,* Captain John A. Winslow commanding, entered the harbor a few days later, and gave battle on June 19, 1864. Within an hour the *Alabama* was sunk, in sight of hundreds of spectators who crowded the shores.

Alabama Claims. During the War of Secession and for several years after its close, the

QUESTIONS ON ALABAMA

(An Outline suitable for Alabama will be found with the article "State.")

Give two theories as to the origin of the name of the state.

What is the "Alabama gopher"?

What is meant by the "Grandfather clause"?

What serious hindrance to navigation is there in the Tennessee River?

How does Alabama compare in size with Mississippi? With Georgia?

How does it rank among the states as regards population? As regards area?

What has been Alabama's chief industrial development since the War of Secession?

What is meant by the "black belt"?

How does the density of population compare with that of Illinois? Of Florida? Of Ontario?

What is meant by the Piedmont region?

If the population of New York were transferred to Alabama, what would be the density per square mile?

What is the capital of Alabama? Has it always been the capital?

Why is Birmingham called the "Pittsburgh of the South"? Contrast the two cities with respect to population; with respect to output.

What were the Yazoo land frauds?

Where was the first railroad west of the Alleghanies?

For what is Fort Mims noted?

How many states, after the original thirteen, were organized before Alabama?

How may the state be divided according to surface features?

What part did Alabama play in the early history of the Confederacy?

What stand did Alabama take from the earliest days of statehood on the subject of education?

When did the first white man enter the territory?

How does Alabama rank among the states of the Union with regard to its coal production?

When did the territory now included in Alabama become a part of the United States possessions?

How does the coal output compare with that of Canada?

What special reason did Alabama have for being strongly in favor of slavery?

What is there especially fortunate in the arrangement of Alabama's productive mineral beds?

What determined the location of Birmingham?

Where does Alabama rank among the Southern states with respect to mileage of navigable waterways?

What is the ratio of railway mileage to area?

Is the population largely urban or rural?

Trace the course of the prohibition movement in Alabama.

When was the first settlement made on the site of Mobile?

In what does Mobile's importance consist?

To how many nations has the Alabama territory belonged?

How many cities has Alabama with more than 100,000 inhabitants? With more than 50,000? With more than 25,000?

What is the state flower?

chief diplomatic issue confronting the United States was whether or not Great Britain was responsible for the damage done by the Alabama and other cruisers fitted out in British ports. After considerable useless negotiation the issue was submitted to arbitration (see WASHINGTON, TREATY OF). The arbitrators were five in number, one appointed by the king of Italy, one by the President of Switzerland, one by the Emperor of Brazil, one by Great Britain and one by the United States. Charles Francis Adams was the American representative, and Sir Alexander Cockburn, Lord Chief Justice of England, represented Great Britain. The arbitrators met at Geneva, Switzerland, on December 15, 1871, and on September 14, 1872, signed the final award. The decision held Great Britain responsible for losses caused by the Alabama and several other ships, and ordered the payment of $15,500,000 by Great Britain to the United States in settlement of all claims. This money was afterward distributed to the individuals who had actually suffered losses.

ALABAMA, UNIVERSITY OF, a non-sectarian, coeducational institution under state control. The seventy-two sections of land which formed the basis of its original endowment were donated by Congress in 1819, the year of Alabama's admission to the Union. In 1884 an additional grant of seventy-two sections was made as compensation for the destruction of the university buildings by Federal troops in 1865. The leases of this land, much of which is coal-bearing, bring an annual return of approximately $50,000, which amounts to one-third of the income of the institution. In 1907 the legislature appropriated $400,000 for the construction of three new buildings, and also increased the annual appropriation for maintenance to $25,000. The legislature of 1911 appropriated an additional $300,000.

The first classes were held in 1831, and the annual attendance is now over 2,000. Except in the professional schools, in which the annual fees range from $25 to $75, tuition is free to residents of Alabama. The teaching staff includes about 150 members, and the library contains 35,000 volumes. The school of medicine is located at Mobile, but the other departments —arts and sciences, education, engineering, law and the summer school—are at Tuscaloosa.

The institution has for many years been furnishing a large percentage of the public professional men of Alabama. Within recent years it has been striving to take the lead in the industrial development of one of the potentially richest sections of the country. Its location in the so-called "Birmingham district" gives to it a strategic opportunity to perform this function. G.H.D.

ALABAS'TER, the name given to a special kind of gypsum, which has a pure white color, and is so soft that it can be scratched with the finger nail. It was a favorite material used by the ancients for statues and columns, and for

FORMS OF OLD ALABASTER VESSELS

the manufacture of vases and ornaments. Alabaster is found in many parts of Europe, but the best variety is found in Italy and in some parts of England. Vases, clock-stands, statuettes and other ornamental articles are made of the finest grade of alabaster. This is sometimes called in England *potters' stone,* because it is also used for moulds in potteries. From inferior grades the cement known as plaster of Paris is made.

The chief center of the alabaster industries is Florence, Italy, where many exquisite works of art are made from a form of alabaster which is found in caves in the form of stalactites and stalagmites (see STALACTITE). This kind of alabaster is very hard and brittle, which make carving and polishing delicate operations.

ALADDIN, *a lad' in,* one of the most popular of all the heroes of legend. He appears in one of the tales of the *Arabian Nights,* in which, from dire poverty as the son of a poor widow, he advances to wonderful wealth, because of the possession of a magic lamp and ring which he gains through his uncle, a wicked magician. Both the lamp and the ring, when rubbed, bring to his aid powerful genii, who are forced to do his bidding. Through his wealth he wins as a bride the daughter of the emperor of China, and for her he orders the slaves of the lamp to build in one night a gorgeous palace.

This is done, but later, when the princess is left alone in the house, she is deceived by the magician uncle, who gains control of the lamp and compels the genii to carry off the palace to Africa. The slave of the ring, however, brings back the palace and regains for Aladdin possession of the lamp, while the wicked magician meets his deserved fate. See ARABIAN NIGHTS.

Allusions to Aladdin's lamp, both serious and humorous, abound in literature. Thus, Byron in *Don Juan* makes use of the expression, "Yes! ready money is Aladdin's lamp."

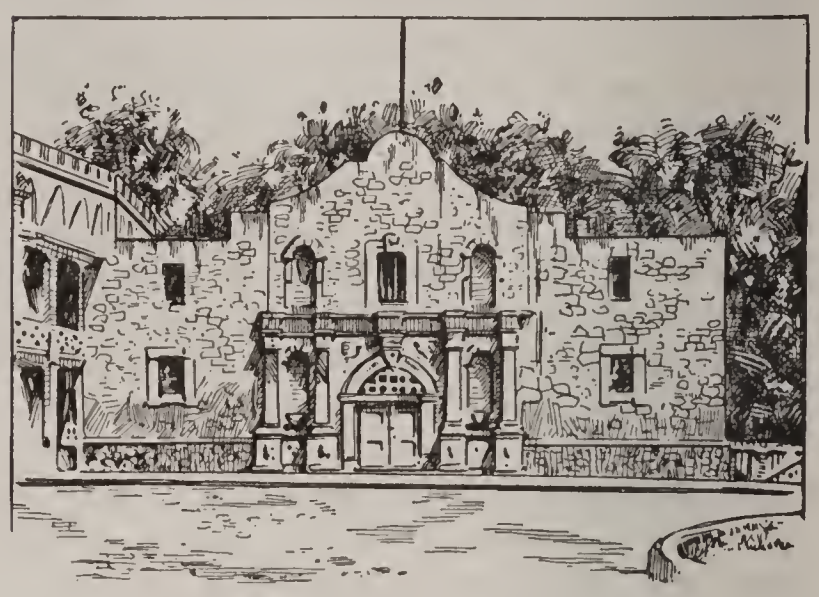
ALAMEDA, *ah la may' dah,* CAL., in Alameda County, is a residential city, situated on an island on the east side of San Francisco Bay, south of Oakland and six miles east and south of San Francisco, with which it is connected by ferry. The Southern Pacific Railroad and electric lines enter the city over bridges spanning the estuary. The area is six and a half square miles. In 1910 the population was 23,383; in 1920 it was 28,806.

Alameda is the home of many San Francisco business men. There are attractive suburban residences, splendid parks and playgrounds, and the city has a Carnegie Library. The fine bathing beaches and municipal bath houses attract visitors during the summer months. In the industrial section along the north shore of the island are large ship-building and ship-repairing yards and important petroleum and borax-refining establishments. The city has also a packers' association and manufactories of aeroplanes, motors, pumps and clay products.

Alameda was settled during Mexican occupation of the territory, was chartered in 1854 and became a city in 1885. In 1913 the commission form of government was adopted. The electric light plant is owned and operated by the municipality.

ALAMO, *ah' lah mo,* the scene of a famous battle fought during the war for Texas independence (see TEXAS, subhead *History*), sometimes called the "Thermopylae of America." It was originally a Catholic mission, moved to the city of San Antonio from the Rio Grande by Padre Olivares, about 1718. The mission was called San Antonio de Valero and consisted of a monastery and church, surrounded by high walls.

The mission San Antonio de Valero, called "The Alamo," by reason of the grove of cottonwood trees surrounding it, was built by Franciscan monks and garrisoned by Spanish soldiers. During the war for Texas independence in 1836, the Mexican General Santa Anna, with an army estimated at from 4,000 to 6,000 men, invaded Texas. A company of 163 Texans under Lieut.-Col. William Barrett Travis, made a stand in the Alamo in order to



THE HISTORIC ALAMO

give Gen. Sam Houston time to organize the Texas army. The border heroes, James Bowie and Davy Crockett, were in the company. J. B. Bonham and nineteen others from Goliad fought their way in.

The siege lasted from February 23 to March 6. Only one man elected to try to escape, and he was never heard from. The little garrison of 183 died to a man for Texas independence. So it is said, "Thermopylae had her messenger of defeat; the Alamo had none." On March 6, with ammunition practically exhausted, they resisted with clubbed muskets until they were all killed. The only survivors were Mrs. Dickinson, wife of one of the officers, her baby, her Mexican nurse and a colored boy. This heroic defense gave General Houston time to organize the Texas army, and on April 21, at San Jacinto, not far from Houston, Texas, he utterly routed Santa Anna and drove his army from Texas. "Remember the Alamo" was the battle-cry that won independence for Texas.

This historic structure stands in the center of San Antonio. It has been purchased by the state and restored as far as possible as it was left by the siege. It ranks with Independence Hall and Bunker Hill as one of the monuments of American liberty. J.B.C.

AL'ARIC I (?-410), the famous barbarian warrior who led the Visigothic invasions in Greece and Italy. In his second invasion of Italy in 410, his army entered Rome in triumph, and sacked it for three days. Though a pagan, Alaric generously spared the religious

ALASKA

POPULATION ‡

The Territory					Towns, 1920			
Year	Total	Per Sq. M.	White	†Colored	Town	Population	Town	Population
1867 *	30,000		10,000	20,000				
1880	33,426	0.05			Anchorage	1,856	Nenana	634
1890	32,052	0.05	8,521	23,531	Cordova	955	Nome	852
1900	63,592	0.1	30,493	33,099	Douglas	919	Petersburg	879
1910	64,356	0.1	36,400	27,956	Fairbanks	1,155	Seward	652
1914 *	66,356		39,000	27,356	Juneau	3,058	Sitka	1,175
1920	55,036	0.1	27,883	27,153	Ketchikan	2,458	Wrangell	821

* Estimates. † Natives include Tlinkits, Aleuts, Athapascans, Esquimaux.
‡ Figures here given do not include the workers in the fishery and other industries, who are in Alaska for the summer only.

VALUE OF LEADING PRODUCTS

Year	Land Furs	Aquatic Furs	Fisheries Products		†Minerals
			Salmon	All Others	
1881	$152,664	$2,690,377	$ 42,771	$125,237	
1891	265,010	1,456,601	2,475,504	281,238	$ 916,920
1901	243,784	1,174,770	6,247,961	437,300	7,007,398
1906	108,900	820,358	8,166,373	488,272	23,375,008
1911			15,127,377		20,072,420
1914	610,000	92,000	14,219,000	982,000	16,537,000
1915	564,000	115,000	18,375,000	850,000	20,940,000
1916	468,000	105,000	18,857,000	773,000	‡43,698,000
1920		1,707,071	36,641,836	4,850,288	23,303,757

Approximate Value of Products from Acquisition of Alaska to June 30, 1916	
Land furs	$ 11,884,293
Aquatic furs	64,693,369
Salmon	216,226,911
Other fish products	21,063,371
Minerals	329,305,025
Grand Total	643,987,969
Purchase Price	7,200,000
Credit to Alaska	635,972,969

† The value of the mineral output from 1880 to 1890 is estimated at $4,685,714.
‡ In 1916 Copper rose to first place among Alaska's export staples, the output being valued at $26,488,000.

COMMERCE

Imports	Calendar Years			
	1917	1918	1919	1920
Merchandise from the United States	$39,838,168	$40,412,258	$37,476,232	$36,876,855
Merchandise from foreign ports	1,196,195	1,175,701	1,449,362	1,512,118
Gold and silver from foreign ports	2,397,237	37,605	31,665	29,500
Total imports	$43,431,600	$41,625,564	$38,957,259	$38,418,473
Exports				
Merchandise to the United States	$76,651,968	$75,026,578	$60,473,623	$60,929,241
Merchandise to foreign ports	3,093,590	1,315,975	1,578,986	1,539,735
Domestic gold and silver to the United States	14,939,440	8,997,655	8,636,139	7,413,751
Foreign gold to the United States	2,008,864	83,360	6,332	28,695
Total exports	$96,693,862	$85,423,568	$70,695,080	$69,911,422
Grand total of imports and exports	140,125,462	127,049,132	109,652,339	108,329,895

PRINCIPAL MOUNTAINS

Mountain	Altitude Feet	Location, Range or Group	Mountain	Altitude Feet	Location, Range or Group	Mountain	Altitude Feet	Range or Group
Blackburn	16,140	Wrangell Group	Hayes	14,000	McKinley Range	Russell	11,350	McKinley Range
Castle Peak	10,314	Wrangell Group	Huxley	11,907	St. Elias Range	St. Elias	18,024	St. Elias Range
Cook, Mount	13,788	St. Elias Range	Iliamna	12,066	Cook Inlet	Sanford	14,000	Wrangell Group
Crillon	15,900	Fairweather Range	La Perouse	10,470	Fairweather Range	Seattle	10,000	St. Elias Range
Drum	12,002	Wrangell Group	McKinley	20,300	McKinley Range	Spur	10,925	McKinley Range
Fairweather	15,290	Fairweather Range	Newton	13,744	St. Elias Range	Vancouver	15,666	St. Elias Range
Foraker	17,10	McKinley Range	Redoubt	11,270	Cook Inlet	Wrangell	17,500	Wrangell Group

PRINCIPAL RIVERS

Name	Outlet	Length Miles	Name	Outlet	Length Miles	Name	Outlet	Length Miles	Name	Outlet	Length Miles
Alsek *	Pacific Ocean	260	Copper	Gulf of Alaska	275	Noatak	Kotzebue Sd.	320	Taku *	Lynn Canal	135
Chandlar	Yukon R.	250	Kobuk	Kotzebue Sd.	237	Porcupine	Yukon R.	500	Tanana	Yukon R	575
Chilkat	Lynn Canal		Koyukuk	Yukon R.	400	Selawik	Kotzebue Sd.	200	Tolovana	Tanana R.	250
Chipp	Arctic Ocean		Kuskokwim	Bering Sea	1,200	Stikine *	Portland Canal	335	Turner	Arctic Ocean	200
Colville	Arctic Ocean	300	Meade	Arctic Ocean		Sushitna	Cook Inlet	225	Yukon*	Norton Sd.	2,300

* Partly in Canada.

INTERESTING FACTS

Alaska is derived from Al-ay-ek-sa, meaning "The Great Land" or "Mainland."
First explored by Russians under Bering and Chirikov in 1741, and afterwards known as Russian America.
First white settlement made at Kodiak in 1783.
Purchased by the United States, March 30, 1867, for $7,200,000.
Created a Territory August 24, 1912.
Area, 590,884 square miles, one-fifth that of the United States. Three-fourths of its area lie within the North Temperate Zone.
Coast-line. The general ocean coast-line is about 4,750 m., and including the islands, bays, inlets and rivers to the head of tide water, is about 26,000 m. in length.
"I predict that Alaska, within the next century will support as large a population as does the entire Scandinavian peninsula of Europe. I predict that you will see Alaska, with her enormous resources of minerals, her fisheries, and her possibilities that almost exceed belief, produce as hardy and vigorous a race as any part of America."—Roosevelt.

Engraved and printed expressly for
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temples in his destruction of many of the Greek and Roman cities. His victories in the western part of the Roman Empire paved the way for the conquest of the Romans in the Iberian peninsula and the founding of the Visigothic kingdom in Spain. See VISIGOTHS.

ALAS'KA, the largest outlying possession of the United States, and its only continental possession in North America. Its area is 590,884 square miles, about one-sixth of the area of the United States proper; this is more than twice the area of Texas and slightly less than the combined area of Alberta and British Columbia. It is a more or less regular rectangular mass, approximately 800 miles long and wide, with long, narrow extensions to the southeast and to the southwest. Its coast line is 8,000 miles long, more than that of the entire Atlantic coast of the United States.

LOCATION MAP
Showing size with respect to the entire continent of North America.

In 1867 the United States bought Alaska from Russia for $7,200,000. This purchase was bitterly opposed by many prominent men, but was vigorously defended by others. The region had formerly been called Russian America, but Senator Charles Sumner suggested a new name, *Alaska.* The word is an English corruption of the native Aleut *Al-ay-ek-sa,* meaning *great land* or *mainland,* which was applied somewhat vaguely to the entire region, but more particularly to the long, narrow strip now known as the Alaska Peninsula.

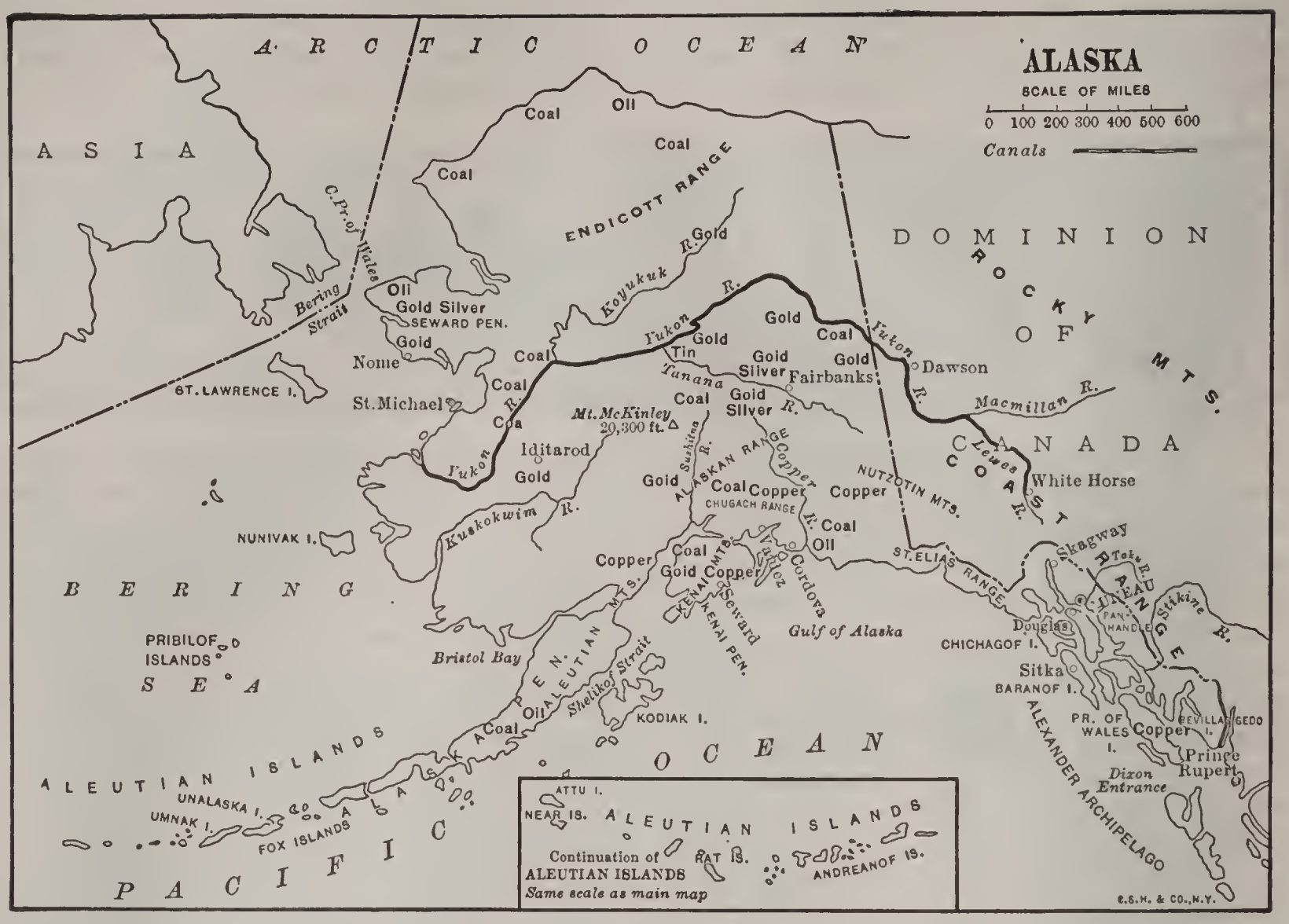
Location. Alaska is still regarded by many people as a land of gold, fur seals, snow and ice. This popular conception is true, but it is only part of the truth. It is no more a polar country than are Norway and Sweden, which lie in almost the same latitude. Point Barrow, the northernmost point of Alaska, is more than 1,200 miles from the North Pole, about the same distance from it as is the North Cape; and the southernmost point of the mainland is in the latitude of Glasgow and Moscow. Its location in an east-and-west line is little appreciated, for it lies far to the west of the United States. Its easternmost point is 700 miles west of San Francisco, and the westernmost point of the Aleutian Islands is in the longitude of New Zealand.

Alaska is itself a vast peninsula, but the name *Alaska Peninsula* is restricted to the extension in the southwest, beyond which lie the Aleutian Islands. These islands, together with the Commander Islands, which extend seaward from Siberia, form the line between Bering Sea and the Pacific Ocean. The northern shores of Alaska are washed by the Arctic Ocean. On the southeast are the islands of the Alexander Archipelago and a long strip of the mainland, which extends southward to the parallel of 54° 41′ N. and shuts off nearly half of British Columbia from the Pacific Ocean.

Physical Characteristics. Alaska is divided into four parts, each of which has individualities of surface and climate. These divisions are described below.

(1) *Pacific Coast.* Practically the entire southern coast, from the westernmost of the Aleutian Islands to the Portland Canal, is mountainous. The coast is not unlike that of Norway, cut by many rocky fiords and straits, and its rugged beauty is the delight of thousands of visitors. Between the mountains and the sea is only a narrow ledge or shelf, and in many places the mountains rise abruptly from the water's edge to a height of 15,000 feet or more. There are many islands along the coast, the largest of which are Kodiak, in the southwest, and Baranof, Prince of Wales, Chichagof and Admiralty, in the southeast.

This remarkably picturesque region is composed of four connected mountain chains,



OUTLINE MAP OF ALASKA

Principal cities, mineral deposits, rivers, international boundary and highest point of land in the peninsula are shown.

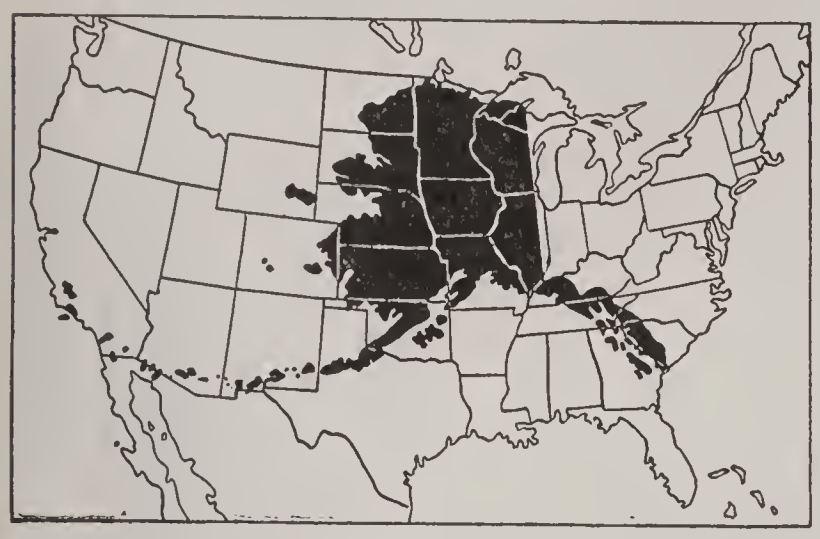
which vary from 50 to 200 miles in width. The long strip between British Columbia and the sea, which is called Southeast Alaska, or the Panhandle, has the Coast Range. This has no well-defined watershed, but has many peaks from 5,000 to 8,000 feet high. The Alexander Archipelago is the remains of a separate, partly submerged chain of mountains, but is usually included in the Coast Range. North of the Chilkat River and Cross Sound is the Saint Elias Range, which has its western end in the Kenai Peninsula. This range has many famous peaks—Mount Fairweather (15,290 feet), Mount Vancouver (15,666 feet), Mount Wrangell, an active volcano (17,500 feet), and Mount Saint Elias (18,024 feet), whose summit is on the international boundary. The Panhandle and the Saint Elias Range have thousands of glaciers, which fill the upper valleys. Many of them reach to the sea, into which they discharge huge icebergs, and perhaps a hundred or more are separated from the coast only by a terminal moraine (see GLACIER). The greatest of all these glaciers is the Malaspina, whose area is nearly one-tenth that of all Switzerland, but the best known is probably the Muir Glacier (both of which see).

The third of the Pacific ranges is the Aleutian, the backbone of the Alaska Peninsula. It ends in the partly sunken Aleutian Islands (which see). The Alaska Range lies a little farther inland, and like the Aleutian Range, has a number of active volcanoes. Its southern end is not noteworthy but in the north it culminates in Mount McKinley (which see), the loftiest peak in North America.

2. *The Central Plateau, or Continental Alaska.* North and east of the coast mountains is a vast plateau, almost the whole of which is included in the basin of the Yukon River. Only a low watershed divides the Yukon basin from the Kuskokwim, the second river in size. The plateau extends practically across the territory from east to west and has an average width of 200 miles. Near the base of the mountains it has an elevation of 4,000 to 5,000 feet, but gradually declines to 1,000 feet, near Bering Sea. Much of the country is a rolling plain, cut into many tablelands by the deep, broad valleys of the rivers.

3. *The Rocky Mountains.* East and north of the central plateau are the Rocky Mountains. On the east they lie almost wholly in Canada, but near the Arctic Ocean the range

turns at right angles. It extends westward and southwestward in two parallel chains called the Endicott Range. As they approach the ocean



COMPARATIVE AREAS

Maps drawn to the same scale show the surprising extent of Alaska's domain.

on the west these two chains separate, the northern being known as the De Long Mountains, and the southern as the Baird Mountains.

4. *The Arctic Slope.* North of the Endicott Range is the only true Arctic section of Alaska. Its southern part, a belt about eighty miles wide, is a plateau, with a maximum altitude of 2,500 feet near the foothills of the mountains. In the north the plateau ends abruptly, and beyond lies an uninteresting coastal plain which extends to the Arctic Ocean. Neither the plateau nor the coastal plain has yet been fully explored.

Climate. The great differences in the character of the surface have an important influence on the climate, and consequently on the plant and animal life. Only in the northern fourth or possibly third is the climate distinctly Arctic. Except for about two months in midsummer, the Arctic Ocean is closed by ice, and the average annual temperature is 24° F. below freezing, or 8° above zero. On the Arctic coast rainfall is only eight to ten inches a year, but along Bering Sea it is from twenty to thirty inches.

The interior has less rainfall and great extremes of temperature. At Eagle, near the Canadian boundary, temperature of 90° F. in summer and —76° F. in winter are not rare. Throughout the basin of the Yukon, the first of October marks approximately the beginning of winter. The snowfall is heavy, and from December to March the average temperature is —20° F. In May the rivers thaw, and summer comes quickly in June. The Alaska summer is a season of almost unbroken daylight. The sun shines brilliantly for eighteen to twenty hours a day, and in the remaining hours there is twilight. Clouds are practically unknown. Even in summer, however, the nights are cool, and frosts in July are not uncommon.

The climate in the coast regions is far different. Southeast Alaska has a temperate climate, like that of the coast of Northwestern United States, and the thermometer seldom registers higher than 75° or lower than zero. The moist winds from the southwest bring abundant rains along the coast and heavy snows on the south slopes of the mountains. The rainfall averages more than ninety inches a year, and even when there is no rain there are heavy fogs. At the western end of the Aleutian Islands it rains or snows most of the time—according to one observer at least on five days in each week. The southern part of Bering Sea is always foggy, but to the north the moisture in the air rapidly decreases.

Animal and Plant Life. The animal life of Alaska includes an astonishing variety of mammals, birds, insects and other classes. In the interior swarms of flies, mosquitoes and gnats make life miserable during the summer months. Moose are still seen occasionally in the forests, and deer are found in the southeast. Caribou were formerly plentiful, and before the coming of the white man constituted almost the sole support of the natives. Their meat was food; their skins were made into clothing, and their bones into needles and other simple tools. The destruction of the caribou herds by the white man finally threatened starvation for the Indians. To prevent this disaster the United States government imported large numbers of domestic reindeer from Siberia. These seem to

THE REINDEER

Alaska's most valuable animal.

thrive and in part, at least, solve the problem of food and clothing; they now number about 50,000 (see REINDEER). Among the smaller animals are wolves, foxes, beavers, weasels and minks. The ptarmigans are plentiful, and eagles are common along the Pacific coast. Each animal here named is described elsewhere under its title.

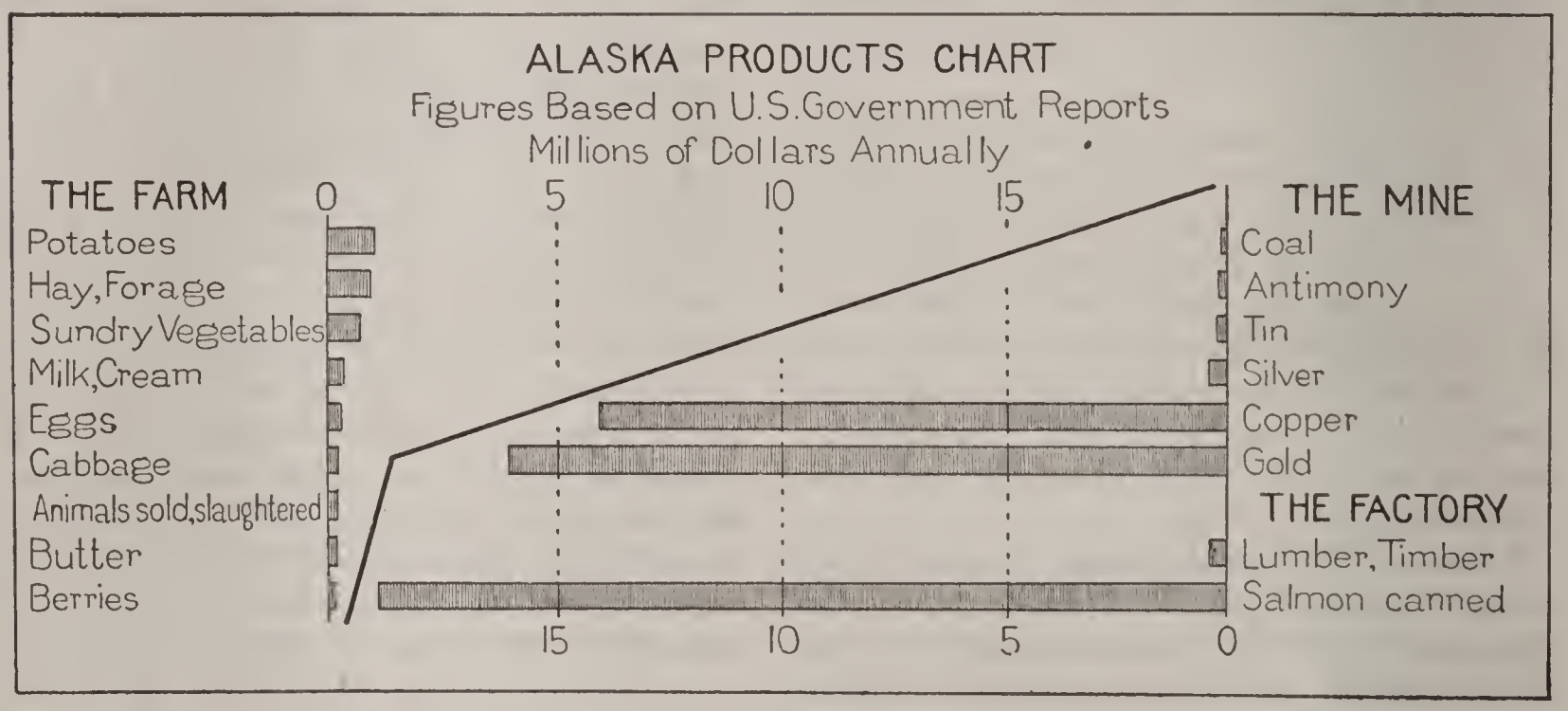
Fisheries. It is the marine animals, however, which are of the greatest economic importance, especially the fur seal and the salmon. The home of the fur seal (which see) is the Pribilof Islands, and the value of the seal skins taken from these islands has already reached a total of more than six times the price paid by the United States for the whole of Alaska. So rapidly did the sealing industry grow that the extinction of the herd was threatened (see BERING SEA CONTROVERSY). In April, 1910, the United States cancelled all existing leases under which seal fisheries were operated, and in 1912 entirely prohibited the killing of seals for a period of five years after January 1, 1913. The sea-otter and the walrus were formerly plentiful, but are now nearly extinct.

The whaling industry is no longer as important as in the early part of the nineteenth century, because the whales are fewer and keep to the north. The natives occasionally kill a whale for blubber, but the commercial importance of the animal is due to the baleen, or whale bone.

Of the fishes taken in Alaska waters the most important are herring, cod, halibut, and most valuable of all, salmon. The largest salmon fishery in the world is on Kodiak Island, on the Karluk River. The Nushagak River and Bristol Bay form another great salmon fishing-ground. The first salmon cannery in Alaska was built in 1878; since then the industry has steadily increased until the annual catch is worth about $20,000,000. The total value of the salmon catch from 1868 to 1915, inclusive, was about $200,000,000, nearly thirty times the original cost of Alaska. The catch of cod shows little variation from year to year, but the catch of herring and halibut is steadily increasing. The young herring are packed, chiefly at Juneau, as sardines.

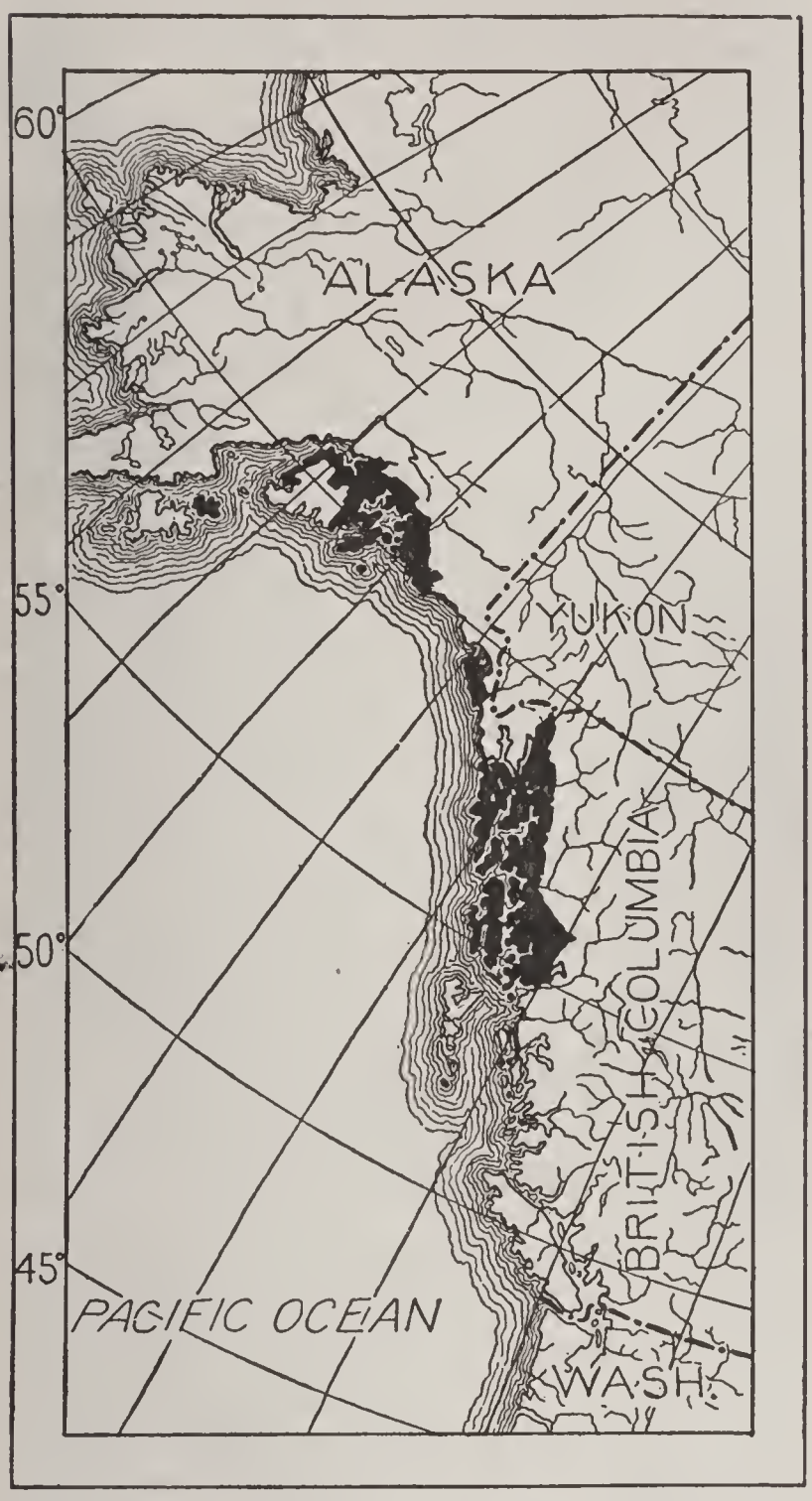
Plant Life. The plant life of Alaska does not show as great variety as the animal life. The Pacific coastal region, especially in the southeast, has rich forests of hemlock, spruce and red cedar, with considerable willow and cottonwood. Probably the most characteristic Alaskan tree is the tide-land, or Sitka, spruce. The interior has extensive areas of black and white spruce, poplar, white birch and alder. With care the stand of timber should always be abundant for local uses, but in the past lumbering has been so carelessly done that the government has felt it necessary to create two forest reserves. The Tongass National Forest includes Southeast Alaska, and the Chugach National Forest extends from Cook Inlet to Controller Bay.

The remainder of Alaska has few trees. Near the Arctic Circle the willows become mere shrubs two or three feet high, and all other trees are gnarled and small. Grasses are abundant in many sections, but the most distinctive features of the plant life are the mosses, which cover one-fourth of all Alaska. These vary in color from pure white to deep brown and green. The tundras, which include the coastal region from the Aleutian Islands northward to Point Barrow and eastward to the Canadian boundary, are covered with



A SMILING GARDEN IN ALASKA. As far north as Fairbanks, where this picture was taken, gardens are common, even though the growing season is short. Fairbanks is over 350 miles from the tempering winds of the ocean.

brown peat moss, herbs and sedges. During the short summer these mosses are dotted by countless millions of wild flowers.



THE GREAT FOREST AREAS OF ALASKA

Agriculture in Alaska is as yet in its first stages, but there is no longer doubt as to its possibilities. Near the mining camps and towns are a few truck farms, and hardy vegetables and cereals are raised with much success. Strawberries and other fruits are raised in the Sitka district, and barley and oats grow well throughout the larger part of the territory. Cattle-raising should become a flourishing industry around Cook Inlet and other favored sections, where native grasses grow in profusion.

Mineral Wealth. Though the existence of mineral deposits was known to the Russians, no serious attempt was made to develop these resources until after Alaska became the property of the United States. Gold was first mined extensively at Juneau, after 1880, and in the next fifteen years was discovered and mined in many other sections. The coast region was for a long time the center of production, and the stamp mills near Juneau are still among the largest in the world. The discovery of the Klondike gold fields, near the boundary between the United States and Canada, is really an event in Canadian history, but it drew hundreds of prospectors to Alaska proper. In 1899 placer gold was first found at Nome, and in that year and the next the hundreds of prospectors found new bonanzas. The gold production of Alaska in 1899 was double that in 1898. Other fields have since been discovered, the most important being the Fairbanks camp on the Tanana River, one of the tributaries of the Yukon. Nearly all the large gold-mining camps are in the Yukon basin or on Seward Peninsula. Placer mining is still the rule, but increasing attention is being given to deep veins. The production in recent years has fluctuated little, the annual average being from $15,000,000 to $18,000,000. The output of silver is usually only about $400,000 a year, and is almost entirely in connection with gold-mining.

Coal. The estimated area of the Alaskan coal fields is 20,000 square miles. The most important deposits are along the Bering River, twenty-five miles east of Controller Bay, and along the Matanuska River, a small stream which empties into Cook Inlet. The coal in these regions is good bituminous and semi-anthracite, but in the other known fields it is of lower grade. The development of this resource has been prevented by lack of transportation facilities and by the many changing restrictions which have been fixed by the United States government (see, below, *History*).

Other Minerals. Copper is now nearly as important to Alaska as gold, the usual output of about $3,000,000 having advanced in 1916 to over $26,000,000. The metal was first mined in 1901 on Prince William Sound, and the annual product ranged from 20,000,000 to 30,000,000 pounds for several years before the record year of 1915, when it amounted to more than 80,000,000 pounds. Most of it comes from the Copper River district, but about half the producing mines are in the Ketchikan region, in the extreme southern part of the territory. Tin and antimony, though still of slight importance, are produced in increasing quantities. Petroleum has been found near the Copper River, and gypsum and marble exist in several islands of the southeast, but not in large quantities.

Commerce and Communications. Alaska has large natural resources, as indicated in the preceding description, but until recently it has had scarcely the beginnings of adequate transportation facilities. In 1899 and 1900, for example, when the gold fields along the Tanana were first being worked, it cost one cent per pound per mile to transport supplies from Circle City to the mines. As the distance was 125 miles this meant a charge of $2,500 to transport one ton. The situation is less desperate now, as several thousand miles of sled and wagon roads have been built in various parts, but the railway mileage in 1914 was only 466. In that year, however, Congress authorized the construction of 1,000 miles of new government-owned railways and the purchase of the existing lines. Surveys were made promptly, and in April, 1915, the new rail route was determined, from Seward, on Resurrection Bay, to Fairbanks, a distance of 467 miles. It includes the former Alaska Northern, which extended northward seventy-one miles from Seward. This is the only railroad owned and operated by the national government, except the Panama Railroad.

THE NEW RAILROAD

The solid line shows the route of the railroad, completed in 1922, save for a 700-foot single span bridge over the Tanana River.

In the past, the rivers have been of great importance, particularly the Yukon and Kuskokwim. These two, with their tributaries, provide navigable waterways about 5,000 miles long. The rivers are free from ice only for two to three months in the year, but this period is long enough for the needs of the valleys. Cordova, Valdez and Seward are connected by cable with Seattle, and military telegraphs run from Valdez to Fairbanks and from Fairbanks down the Yukon to Saint Michael. There are also a number of wireless stations maintained by the government.

Trade and commerce are confined largely to the exportation of raw products and the importation of supplies. Gold and fish are sent chiefly to Seattle, Tacoma and San Francisco, and these ports ship machinery and other manufactured goods in return. The exports are worth approximately $45,000,000 to $50,000,000 a year, and are about double the imports.

The People. The total population according to the census of 1920 was 54,899, which provided an average of but one person to nine square miles. This was a decrease of 9,457 from that of 1910; it represents a decrease both in white population from the States and in the native population to a slight degree. The Chinese are less numerous than formerly. About one-third of the total population is foreign-born or native-born of foreign parents, and a little more than one-half is white. Swedes, Norwegians, Canadians, Germans and Irish are the leading foreign elements, in the order named. Five-sixths of the whites are males.

The natives of Alaska may be divided into four great stocks or groups—the Aleuts, Eskimos, Thlinkits or Tlingits, and Athapascan. The last group, which numbers about 4,000, is one of the North American Indian families. The Aleuts, famous as boatmen and hunters

HOW FREIGHT IS CARRIED ON THE YUKON

of the sea-otter, live only on the Alaska Peninsula and the Aleutian Islands. They have slowly decreased in number until only 1,500

are left. The 5,000 Tlingits and the 500 Haidas, an allied stock, live in Southeast Alaska. The best known and the most numerous of these groups are the Eskimos (which see). They live chiefly along the shores of Bering Sea and the Arctic Ocean.

The spiritual, moral and economic condition of the natives has been a burden upon the white people since the first days of Russian occupation. Many of the natives promptly became Christians, and the Greek or Russian Orthodox Church still maintains missions in Alaska. Since 1867 many other religious denominations have established missions, and to-day practically the entire native population at least professes Christianity. Schools were formerly maintained in connection with nearly all missions, but all native schools are now under the control of the United States Bureau of Education. The introduction of the Siberian reindeer, to take the place of the caribou, is also the work of this Bureau. Another factor which has helped the condition of the natives is the rigid enforcement, since 1909, of laws prohibiting the sale or even the gift of intoxicating liquors to natives.

Most of the natives live in small settlements in a more or less strict tribal organization. Many of these settlements are near, and often larger than, the cities and towns built by the whites. Fairbanks, with 3,541 people in 1910, is the largest incorporated city, and the other important towns are Nome, Cordova, Juneau (the capital), Ketchikan, Treadwell, Douglas, Skagway and Valdez. Seward, the terminus of the government railway, was incorporated in 1912, and Tanana, a mining community, in 1913. Sitka, once the capital and most important city, now has only 500 people. All incorporated towns have public schools, supported chiefly by various license fees.

Other Points of Interest. Measured in degrees of longitude, the difference between the most easterly point of Alaska and the most westerly point of its island chain is greater than that between New York and San Francisco; but the distance in miles, 2,650, is about 600 less, since Alaska is much farther north, where the degrees are shorter.

When Secretary Seward was asked what he regarded as the most important act of his official career he replied without hesitation, "The purchase of Alaska."

Some of the Indians of Alaska make lamps very simply. They use the dried body of a fish, merely passing a pith or bark wick through it. So oily is this "candlefish," as it is called, that it keeps the wick burning a long time.

Among the popular nicknames of Alaska are "Seward's Folly" and "Uncle Sam's Ice Box."

A traveler has written, "In Alaska a glacier is a wonderful torrent that seems to have been suddenly frozen when about to plunge into the sea. Down and down mountains wind these snow-clad serpents, extending miles inland, with as many arms sometimes as an octopus. . . . Think of Niagara Falls frozen stiff, add thirty-six feet to its height, and you have a slight idea of the terminus of Muir Glacier."

The "Labrador huskies," long-legged, shaggy dogs, are still in many parts of Alaska the chief motive power for transportation, each dog pulling easily a load of about 150 pounds. The native Indian dogs are also used, but they are always hungry and are such thieves that they are not entirely satisfactory.

In the winter the nights are twenty-two or twenty-three hours long in the Arctic region, but the light from the aurora borealis is so strong that work goes on just as usual.

When the United States purchased Alaska the general opinion was that it was "wasteful extravagance to pay $7,200,000 for 590,000 square miles of icebergs and polar bears."

The United States mail sledge is drawn by dogs, the pick of the lot, and seem to delight in their work. The government has considered the question of transportation of mails by airships in certain sections of the country; it has been declared entirely feasible.

Perhaps nothing more accurately describes the interior of Alaska than that expression beloved of writers—the Great White Silence.

In ancient geologic times Alaska was the home of great herds of mammoths, those huge, hairy elephants which were so much larger than any animals that exist to-day.

Salmon furnishes the chief food of the Indians of the Pacific coast. Travelers declare that the dried fish are stored in such great quantities against the coming of winter that they form a floor, several feet thick, in the Eskimo huts. Each day parts of this "floor" are eaten, until by summer the snow floor appears.

Scientists say that the Yukon carries to the sea almost as much water as does the Mississippi, and that its vast floods keep the sea water fresh several miles from the coast.

The latitude range of Alaska is as great as from Duluth to New Orleans.

In the Panhandle region there are literally

thousands of glaciers, over a hundred of which almost reach the sea.

In November, 1916, Alaska set an example to older communities by voting for prohibition throughout the territory.

Mail is regularly delivered beyond the Arctic Circle.

In 1916 copper rose to first place among Alaska's exports, supplanting gold and salmon. During the fiscal year ending June 30, 1916, there was received in the United States from Alaska $26,500,000 worth of copper.

Government. From 1867 to 1912 Alaska was an unorganized territory; all of its officers were appointed by the President of the United States and all its laws were made for it by Congress. On August 24, 1912, President Taft approved an act of Congress organizing the territory and providing self-government. The capital was fixed at Juneau, where the legislature meets in the odd-numbered years. The Senate is composed of eight members, chosen for four years, and the House of Representatives has sixteen members, chosen for two years. The governor, appointed by the President, may veto any act of the legislature. All laws must be approved by Congress before they go into effect. At its first session, in 1913, the legislature granted suffrage to women on the same terms as men; in 1915 it abolished capital punishment. Alaska sends one delegate to the House of Representatives at Washington; he has few of the privileges of a Representative; he may not vote, even upon matters pertaining to Alaska, and his right to speak is restricted to subjects relating to his territory.

Communities of more than 300 people may incorporate as towns and conduct their own local affairs. With this exception, there is no local government. There are four Federal judges appointed by the President, one for each of the judicial districts; the courts are held at Juneau, Nome, Valdez and Fairbanks.

History of Alaska

Alaska is the only part of the New World which was discovered and first explored by white men who came from the West. The Russian Cossacks are thought to have reached the Alaskan coast about the last quarter of the sixteenth century, but it was not until 150 years later that real explorations began. The most famous of the explorers is Vitus Bering (whose life is presented elsewhere in these volumes). The first settlement was made on Kodiak Island in 1783, and in the next fifty years exploration continued with good results. The English and Canadians, coming from the east, reached the Pacific through the river valleys, the Russians continued to cross Bering Strait, and Frenchmen, Spaniards and Englishmen also sailed northward along the Pacific coast.

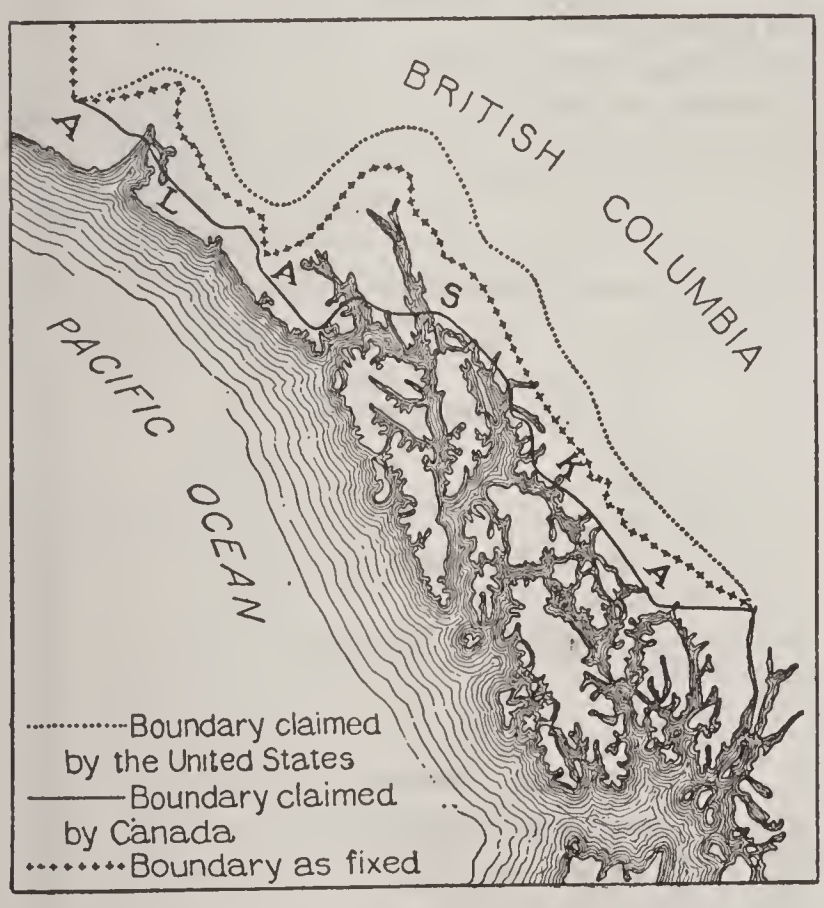
The most important of these early exploring trips was that of Captain James Cook, who surveyed almost the entire coast line from Cross Sound to Cape Lisburne (see COOK, JAMES). The explorations of Sir Alexander Mackenzie, George Vancouver and Sir John Franklin are also noteworthy. The Russians explored the lower courses of the great rivers and employees of the Western Union Telegraph Company did valuable work in 1865 and 1866. It was planned to connect Europe and America by telegraph through Alaska and Siberia, and the work of exploration and laying out a course was well under way when the success of the Atlantic cable put an end to this plan.

Purchase by the United States. Russian official interests in Alaska were concerned only with the fur trade. In 1788 the Russo-American Company was given a monopoly of the trade, which it held until 1861. The vast region was regarded by the Russians only as a source of furs, and when the supply of these began to show signs of decreasing, the country was considered less valuable. Negotiations for its sale to the United States were begun as early as 1859, but it was not until 1867 that a treaty of sale was negotiated by William H. Seward, then Secretary of State. The United States paid Russia $7,200,000 in gold.

There was bitter opposition to this purchase, for many Americans, then as now, believed Alaska to be a useless mass of rock, snow and ice. Fortunately the opposition was defeated. In the forty years following 1867 the United States government received directly, merely from the taxes on sealskins and other sources, nearly double the purchase price. The total exports of fish, furs and gold from Alaska to the United States alone exceeded $600,000,000 in the first half century of American ownership. Those who know Alaska declare that its resources are still undeveloped, and that the future production of the territory will reach even greater totals.

Boundary Dispute. In 1825 Russia and Great Britain by treaty fixed a boundary between British and Russian territory in North America. For sixty years there was no quarreling over the interpretation of the treaty, although the Russian rights had meanwhile been transferred to the United States. For sixty years the boundary, from Mount Saint Elias southward, had been a line ten leagues, sixty miles, inland from the coast. This line followed all the windings of inlets and promontories. About 1885 Canadians began to assert that the boundary was incorrect, and in 1888 the Canadian government formally called the attention of the United States to this difference of opinion. The boundary, it was asserted, should be ten leagues east, not of the actual winding shore-line, but of a line drawn from headland to headland. Such a line would place the heads of many inlets in Canadian territory and would leave the United States with but a few islands and broken strips of mainland.

The disputed territory was at once surveyed, but a crisis did not come until 1896, when the gold discoveries in the Klondike brought thousands of prospectors and made a Pacific outlet of greater importance to Canada. The Alaska



THE BOUNDARY DISPUTE
Showing conflicting claims and final adjustment.

boundary was one of the problems discussed by the Joint High Commission (see CANADA, subhead *History*), but the commission was unable to arrive at conclusions. Finally, in 1903 a special Alaska Boundary Tribunal was appointed to settle the meaning of the original treaty between Russia and Great Britain. Great Britain's representatives were Baron Alverstone, then Lord Chief Justice of England, Sir Louis A. Jette and Hon. Allen B. Aylesworth, two distinguished Canadians. The United States was represented by Henry Cabot Lodge, Elihu Root and George Turner. The decision of this tribunal favored the United States, Baron Alverstone voting with the American commissioners. About one-third of the disputed section was given to Canada when the boundary line was surveyed, this survey being completed in 1914.

Development of Coal Lands. The attempts to open up the great coal fields of Alaska aroused a bitter controversy which practically prevented the development of this resource. In 1900 the public land laws, so far as they affect coal-bearing areas, were extended to Alaska. These laws, however, were ineffective, because they applied only to surveyed land, whereas the Alaska coal fields were unsurveyed. A supplementary act of Congress in 1904 remedied this defect by allowing individuals to make private surveys as a basis for locating 160-acre claims. Late in 1906 an executive order, issued by President Roosevelt, withdrew all coal lands from entry, but was amended by a later order which exempted any claims located before November 12, 1906. The reason for this change of policy was the desire to eliminate fraudulent claims. In the two and a half years during which the Act of 1904 was in force, practically all of the Bering River coal field was divided into claims. These claims were held either by individuals, or by agents acting in the name of the claimants.

One of these agents was Clarence Cunningham, who represented thirty-three adjoining claims, probably the most valuable in the field. The Cunningham claims were all but patented when rumors of fraud began to spread. Most of the claimants were business men who could not be suspected of acting for corporation claimants, but it was rumored that they were planning a combination of interests, contrary to law. The charges were first investigated in 1905, and in 1911 the Cunningham claims were cancelled as fraudulent. In the intervening six years the investigation had first lagged and then been pushed zealously. It led to controversy between several government officials, and finally required the attention of President Taft and Congress. The Secretary of the Interior, Richard Ballinger, had been Commissioner of the General Land Office in 1907 and 1908, and had been legal counsel for the Cun-

OUTLINE AND QUESTIONS ON ALASKA

Outline

I. Location

(1) Latitude—54° 40′ to 71° 31′ north
(2) Longitude—129° 58′ west to 172° 22′ east (with islands)
(3) Distance from North Pole

II. Size and General Characteristics

(1) Area
  (a) Comparative
  (b) Absolute
(2) Shape
(3) Coast line
(4) Alaska Peninsula and Aleutian Islands

III. Physical Characteristics

(1) Coast region
  (a) Islands
  (b) Mountain chains
    1. Coast Range
    2. Saint Elias Range
    3. Aleutian Range
    4. Alaska Range
  (c) Great peaks
(2) Continental Alaska
  (a) Plateau formations
  (b) Rivers
(3) Rocky Mountains
(4) Arctic slope
  (a) Plateau
  (b) Coastal plain

IV. Climate

(1) Dependence on surface features
(2) Temperature and rainfall
  (a) In coast region
  (b) In interior
  (c) On Arctic slope

V. Plant Life

(1) Forests
  (a) Forest reserves
(2) Grasses and mosses

VI. Animal Life

(1) Caribou
(2) Reindeer
(3) Marine animals

VII. Industries

(1) Agriculture
(2) Fisheries
  (a) Seal fishery
  (b) Whaling
  (c) Salmon fishery
  (d) Other fish
(3) Mining
  (a) Gold
    1. History
    2. Output
  (b) Coal
  (c) Copper

VIII. Communication

(1) Roads
(2) Railroads
(3) Navigable rivers
(4) Cable and telegraph

IX. Commerce

(1) Exports
(2) Imports

X. Population

(1) Density
(2) White inhabitants
(3) Native groups
  (a) Aleuts
  (b) Athapascan
  (c) Eskimo
  (d) Tlingits
(4) Education of natives
(5) Cities

XI. Government

(1) Governor
(2) Legislature
  (a) Senate
  (b) House of Representatives
(3) Judiciary
(4) Representation in Congress
(5) Suffrage
(6) Capital

XII. History

(1) Discovery and exploration
(2) Settlement
(3) Ownership
  (a) Russian
  (b) Purchase by United States
(4) Dispute over boundaries
(5) Discovery of gold
(6) Development of coal lands
  (a) Fraudulent claims
  (b) Adjustment
(7) Cost of Alaska, and returns

Outline and Questions on Alaska—Continued

Questions

What does the name Alaska mean?
What are "huskies"?
What use is made of them in Alaska?
How far north do the United States mail routes extend?
Why does the Eskimo eat the floor of his hut?
How did the United States gain possession of Alaska?
What was the general verdict regarding the transaction?
Were those responsible for it ever justified in public opinion?
Is any part of Alaska directly north of the United States?
Give two nicknames commonly applied to Alaska.
Why is fur seal fishing no longer as profitable as it once was?
What measures has the United States taken to offset the damage that has been done in this direction?
What animal, formerly the sole support of many of the natives, has been almost destroyed by the white man?
Has anything been done by the government to make up for the loss?
Which is the most picturesque region of Alaska?
What is the narrow strip between British Columbia and the ocean called?
How many glaciers is it estimated to have?
Are working days in the Arctic region limited in winter to the hour or two of daylight?
To what curious use do the natives put the candlefish?
Sketch briefly the amazing development in copper production in the last few years.
How does the Kodiak bear compare in size with other bears?
How many miles of navigable waterway do Alaska's two great rivers furnish?
How does the Yukon rank as to size among the rivers of North America?
How does Alaska compare in size with the other territorial possessions of the United States combined?
What is the average density of population?
If all the people in the United States were transferred to Alaska, would Alaska have a population as dense as that of New York?
How large a population would Alaska have to have to be as thickly settled as Belgium?
Could it support so large a population?
How does the area of Alaska compare with the combined areas of Germany and France?
In what way does the southern coast of Alaska resemble the coast of Norway?
Where is the highest land in North America?
In whose favor was the Alaskan boundary dispute settled?
Describe briefly the largest glacier in Alaska.
What sort of vegetation clothes one-fourth of Alaska?
How much of Alaska has a distinctly Arctic climate?
Why has the southern coast region such a heavy rainfall?
Why is whaling no longer the important industry it once was?
What is a tundra?
If the United States had taken nothing from Alaska but salmon, would its purchase have been justified?
Sketch briefly the history of the gold-mining industry.
Has gold always been the largest annual output of Alaska?

ningham claimants before entering the Cabinet. A special committee of Congress exonerated Secretary Ballinger from knowledge of attempted fraud, but he resigned because he felt that his usefulness to the administration was at an end. Between 1911 and 1913 nearly three-fourths of the land claims were cancelled by the government.

In 1914 a new policy was inaugurated. By authority of Congress all coal lands are to be surveyed, and parts of them are reserved for the United States. This reserved area must not exceed 5,120 acres in the Bering River field, 7,680 in the Matanuska field, or one-half of the area of other fields. All lands not reserved may be leased to individual citizens or American corporations for periods of fifty years. The minimum area allowed under leases is forty acres, the maximum is 2,560 acres. The royalties derived from the leases are to be used by the government for the development of Alaska. For local or domestic use blocks of ten acres may be leased without payment of royalties. W.F.Z.

Consult the publications of the United States Bureau of Education, Washington; also, Greeley's *Handbook of Alaska;* Balch's *The Alaskan Frontier.*

Related Topics. A more detailed knowledge of the geography of Alaska may be gained from the articles on the followings topics:

CITIES AND TOWNS

Fairbanks — Nome
Juneau — Sitka

COAST WATERS

Arctic Ocean — Cook Inlet
Bering Sea — Pacific Ocean
Bering Strait

ISLANDS

Admiralty — Kodiak
Aleutian — Pribilof
Bering — Unalaska

LEADING PRODUCTS

Coal — Salmon
Copper — Seal
Gold — Whale

NATIVE TRIBES

Aleuts — Eskimo
Athapascan — Tlingits

RIVER

Yukon

ANIMALS

Seal — Reindeer

SURFACE FEATURES

McKinley, Mount — Rocky Mountains
Malaspina Glacier — Saint Elias Mountains
Muir Glacier

ALASKA-YUKON-PACIFIC EXPOSITION, held in Seattle, Wash., from June 1 to October 16, 1909. Though organized primarily to advertise the resources of Alaska, exhibits were sent from Canada, from many states of the Union, and even from European countries. The exposition grounds, which were on a narrow peninsula between Lake Washington and Lake Union, included 250 acres. The main buildings, which were in the French Renaissance style of architecture, were grouped on both sides of a beautiful terraced court, at the head of which stood the United States Government building. The lower end of the court, which was left open, afforded a magnificent view of snow-capped Mount Rainier. Seven of the buildings became the property of the University of Washington after the close of the exposition. The total attendance was 3,740,561, and the total expenses exceeded $10,000,000. The exposition closed with every debt paid.

ALBA'NIA, the youngest country of Europe, situated in the western extremity of the Balkan Peninsula, and stretching along the southeastern shore of the Adriatic Sea, where that sea is at its narrowest. Before the Balkan

LOCATION OF ALBANIA

Black area (*a*) is Albania. Surrounding countries are (*b*) Italy; (*c*) Germany; (*d*) Austria-Hungary; (*e*) Montenegro; (*f*) Serbia; (*g*) Bulgaria; (*h*) Rumania; (*i*) Russia; (*j*) Greece; (*k*) Turkey.

Wars (which see) this region was part of Turkey. It is bounded by Montenegro, Serbia and Greece.

Founding of the New State. Albania was created by a conference of ambassadors of the Great Powers which was held in London in 1912 and 1913 in order to settle the problems arising out of the war between the Balkan allies and Turkey. At the insistent requests both of Austria and Italy, and in order to avoid great European complications, the ambassa-

dorial conference accepted the principle of the autonomy of Albania. The fixing of the boundaries of the new state was a difficult problem, partly on account of the demands of Serbia for an outlet on the Adriatic Sea, which could have been accomplished only through Albanian territory. This question became still more acute after the Montenegrins, in April, 1913, took the town of Scutari, which they wished to annex. Albania therefore assumed importance at that time on the political and diplomatic horizon of Europe.

The Albanians offered the crown to Prince William of Wied, a nephew of the late queen of Rumania, well-known under her literary name of "Carmen Sylva." Prince William accepted the crown and arrived at Durazzo on March 7, 1914. His reign was short. An insurrection broke out, and the prince abdicated in September, 1914, a short time after the War of the Nations began. A provisional government was established under Essad Pasha, an Albanian leader. In 1917 the country was proclaimed an independent republic, with Durazzo as the capital. In December, 1920, it was admitted to the League of Nations.

Area and Population. The frontiers of the new state were fixed by an international commission. Albania covers an area of 10,500 to 11,500 square miles, or a little more than the land area of Maryland. The population is roughly estimated at 1,400,000. But the state does not include all the territory where the preponderating population is Albanian. Many Albanians are under the rule of the neighboring states of Montenegro, Serbia and Greece. If these are added the number of Albanians would reach about 1,500,000.

The principal cities are Durazzo, the capital; Scutari, Elbasan, Tirana, Argyrocastro, Berat, Koritza and Valona. The most important of them are treated under their titles in these volumes.

The country is very mountainous, being traversed by several high ranges, separated by long and narrow valleys. The mountains are clothed with extensive forests, and it is believed they are rich in minerals. The chief rivers, the Boyana, Shkumb, Drin, Viossa and Arta, are too rapid to be navigable. There are few good roads in the country, and no railroads whatever. Bridle-paths are almost the only means of communication. There are very few bridges over the rivers. One of the most pathetic episodes during the War of the Nations was the retreat of the Serbian army before the victorious Austrians through this wild country, in the fall of 1915.

National Characteristics. The Albanians present a distinct national type and possess some remarkable qualities. Although ignorant and superstitious, these mountaineers are truthful, brave and faithful. They make excellent soldiers and retainers, and they formerly supplied the Turkish army with some of its best fighters; the bodyguard of the sultan of Turkey has often been composed of Albanians. Most of the attendants at the foreign embassies and consulates in Eastern Europe are Albanians, and travelers in this part of the world are impressed with the physical appearance, the picturesque native dress, as well as the fine array of arms they carry. For, when thus employed, they are heavily armed and display their weapons in such a manner that anyone can see them.

Language. The Albanian language is interesting, for it is different from any other language in Europe. It belongs to the family of the Indo-European languages and is related to Latin and ancient Greek. It seems to be the only surviving language of what was probably the primitive speech of the inhabitants of the Balkan Peninsula. The language has two widely different dialects, which are spoken respectively by the two chief divisions of the nation, namely, the Ghegs in the north and the Tusks in the south.

Religion. About two-thirds of the Albanians are Mohammedans; of the remainder those in the north are mostly Roman Catholics, while many in the south belong to the Greek Orthodox Church.

Customs. *Tribal Organization.* The Albanians are the oldest original inhabitants of the Balkan Peninsula. On account of the mountainous nature of the country they have retained their marked national individuality and their ancient institutions and customs. They are the only people in Europe who have preserved to the present day the organization in tribes. The tribe is usually composed of several clans, and each clan is under a chief who is, strictly speaking, a military leader. The tribal organization regulates not only the political but also the social relations of the people. Thus, a man is not allowed to marry a woman of his own tribe. The tribal organization has been preserved more fully in the mountainous regions in the north, while in the south it has been supplanted by a sort of feudal system.

The Blood-Feud. One of the customs which plays an important part in the life of the Albanians is the blood-feud, or blood-vengeance. When a man is killed it is the duty of his family to avenge him by the death of the murderer or one of his male relatives, so a feud involves not only individuals but also families. The murderer usually takes refuge in the mountains from the avenger of blood or remains for years shut up in his house. In the opinion of an Albanian, blood can only be avenged with blood. The blood-vengeance is not a lawless impulse of savages, but a social obligation which is subjected to as strict a code of laws as the laws of the duel, for instance. A feud only ends with the death of the murderer; but sometimes peace is made by the payment of a certain sum to the family of the murdered man. Women are never involved in a blood feud; in fact, the avenger must not kill his victim when the latter is accompanied by a woman or a child.

Marriage. Marriage is always arranged by the fathers of the young people. The betrothal takes place when the children are quite young. An Albanian wife is always bought, and the father of the boy pays part of the purchase money at the time the arrangement has been concluded. The balance is paid on the wedding day. The young girl may refuse to marry the man selected for her, but in that case she must take a solemn oath to remain single all her life. The young man is obliged to marry the girl to whom he is betrothed, otherwise he starts a blood-feud with her family.

History. This region, known in ancient times as Illyria, was conquered by the Romans during the second century before our era. During the Middle Ages it was invaded by various Slav peoples, who settled here. When the Turks began the conquest of the Balkan Peninsula the Albanians fought heroically for their independence. Under their celebrated leader, George Castriota or Scanderbeg, the Albanians fought the Turks successfully from 1444 to 1456. But after his death the Turks conquered the country in 1478 and made it a Turkish province. Many Albanians then embraced Mohammedanism.

The country was almost independent from 1807 to 1822, when it was under the rule of Ali Pasha of Tepelen, surnamed the Lion of Janina, who is mentioned in Lord Byron's poems. In 1880 the Albanians tried to gain their independence, but were unsuccessful.

Outline and Questions on Albania

I. Location

II. Size

(1) Comparative
(2) Absolute
(3) Population

III. Surface Features

(1) Mountains
(2) Rivers

IV. The People

(1) Distinguishing characteristics
(2) Language
(3) Religion
(4) Education
(5) Interesting customs
  (a) Tribal organization
  (b) Blood-feud
  (c) Marriage

V. History

(1) Subjection to Turkey
(2) Attempts at independence
(3) Independence recognized by Great Powers

Questions

What are the religions of the people?

In what part of the country is Italy especially interested?

Is it easy to travel in Albania?

What Albanian has figured in American literature?

What sort of language have the people?

What is the state of education?

What are the strange marriage customs of this land?

Who is Prince William of Wied?

What famous Italian statesman was an Albanian?

When was the independence of Albania proclaimed?

What was this region called when it was a part of the Roman Empire?

What ancient system of organization have the Albanians been the only people in Europe to preserve?

After the Young Turks revolution in Turkey in 1907, Albania was in continual revolt, with the aim of gaining its independence. Finally, during the Balkan War, the people proclaimed their independence at Avlona on November 18, 1912, and this was recognized by the ambassadorial conference in London. The fate of this troubled little country after the War of the Nations became one of the diplomatic problems of Europe.

Further Interesting Facts. Albania is the only country in Europe without railways.

Avlona, also spelled Valona, is connected with the Italian port of Otranto, sixty-five miles away, by a submarine cable.

The Albanian title of Prince William of Wied was *Mpret.*

One of Italy's demands on Austria in its note of April 8, 1915, previous to entering the War of the Nations, was that Austria should renounce all interest in Albania and acknowledge Italian sovereignty over the shores of the bay of Avlona. In answering, Austria agreed to renounce all political interest in the little country.

The hero of Fitz-Greene Halleck's poem *Marco Bozzaris* was an Albanian. His story appears in these volumes.

Francesco Crispi, the Italian statesman who created the Triple Alliance, was a descendant of the Albanians who fled to Italy and Sicily when the Turks first invaded Albania.

Education is Albania's greatest need. Aside from the church institutions, open, of course, only to Christians, there are practically no schools. A normal school at Elbasan, founded by native leaders, was suppressed by the Turks in 1910 and all persons connected with it were publicly beaten. O.B.

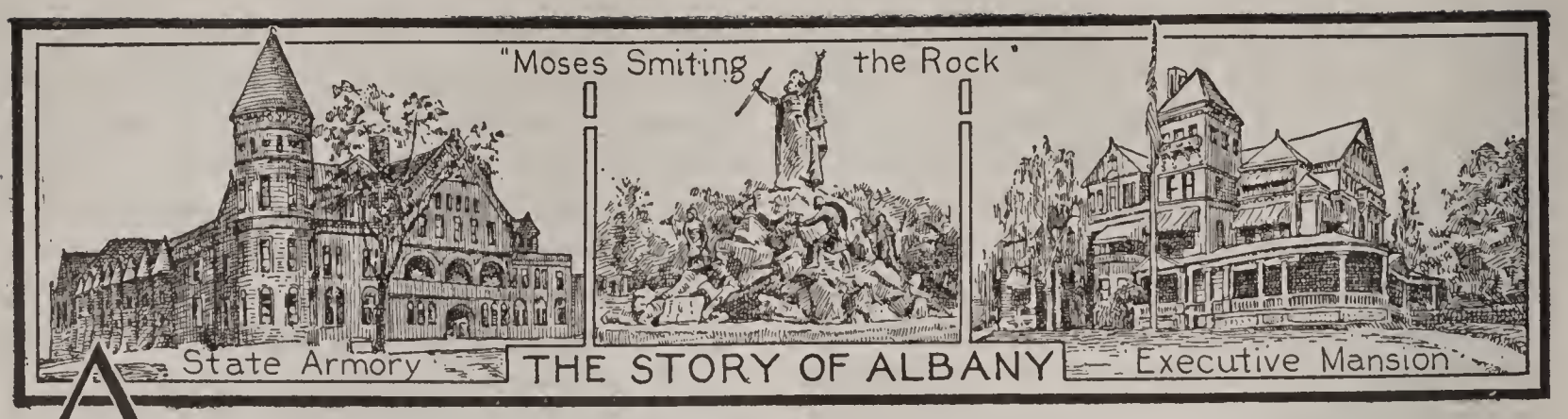
ALBAN MOUNTAINS, a group of low mountains of volcanic origin, lying in the central part of Italy, thirteen miles southeast of Rome. They have several extinct craters, two of which are the beds of lakes. On the central crater, 3,145 feet above sea level, a temple to Jupiter stood in ancient times. The Romans made these mountains a popular resort because of their agreeable climate and beautiful scenery.

ALBANY CONVENTION, a representative assembly which met at Albany, N. Y., in June, 1754, and drew up the first scheme for a political union of the American colonies. It was summoned by the British government, and was made up of delegates from Massachusetts, New Hampshire, Connecticut, Rhode Island, New York, Pennsylvania and Maryland. After proposing a union with the Five Nations in the war with France, it drew up, at the instance of Benjamin Franklin, a plan for a government, which was to consist of a president-general, appointed by the Crown, and a Grand Council of representatives from the colonies. Though rejected by England and the colonies, the scheme is important as one of the first steps toward final union of the Americans.

ALBANY, GA., an active commercial city, popularly called THE ARTESIAN CITY, on account of an abundant supply of artesian water, which is used for all the requirements of its people. The city was founded in 1836, was incorporated in 1838 and named for Albany, New York. The population, chiefly American, increased from 8,190 in 1910 to 11,555 in 1920; the area is over three square miles.

Albany is the county seat of Dougherty County, and is situated in the southwestern part of the state, about 188 miles south of Atlanta, 107 miles southwest of Macon and 210 miles west of Savannah. The Atlantic Coast Line, Seaboard Air Line, Central of Georgia, Georgia Southwestern and Gulf, and Georgia Northern railways, offer railway accommodations, and the Flint River, which is navigable up to this point, affords steamer transportation. The principal industrial enterprises are cotton compresses, fertilizing factories, cotton-oil mills, brick plants and lumber manufacturing plants. A Federal building erected in 1911, at a cost of $125,000, a $65,000 city hall constructed in 1909, and a $75,000 Municipal Auditorium built in 1916, are structures worthy of note. One of the nine municipal abattoirs in the United States, and the only one municipally owned and controlled in Georgia, is located here. An excellent school system, a Carnegie Library and a business college offer educational advantages, and the city has a public hospital and six banks.

This rapidly growing city is situated in one of the richest agricultural sections of Georgia, which produces cotton, corn, hay, oats, watermelons, wheat, muskmelons, fruits and vegetables. The pecan-raising industry has attracted considerable attention to this district, about 50,000 acres being devoted to the cultivation of paper-shell nuts. Albany is also a favorite health resort, climatic conditions being excellent, and there are beautiful parks, fine roads for motoring, and a country club. The famous Blue Spring is in the vicinity. J.H.M.



ALBANY, N. Y., the capital of the state, the county seat of Albany county and a city of historical interest, for it is one of the oldest in the Union. It is located on the west bank of the Hudson River, in the eastern part of the state, about midway between its northern and southern borders. New York City is 145 miles south, and Boston is 165 miles southeast. Albany is the gateway for traffic and travel between Boston and New York and the west and north. It has railway communication through the Boston & Albany, Boston & Maine, Delaware & Hudson, New York Central and West Shore railways, and water connection to the interior of the state and to the north by way of the Erie and the Champlain canals. With the ocean it is connected by the Hudson River, navigable to this point by large steamers, smaller ones going six miles farther to Troy. Electric lines communicate with adjacent cities. The population increased from 100,253 in 1910 to 113,344 in 1920. The area of the city is fifteen square miles.

Parks and Boulevards. Albany extends for four miles in a narrow plain along the river, and in this section it is frequently flooded in the spring. From this ground it rises to a plateau 200 feet above tide-level, and presents an attractive appearance, with its fine buildings and beautiful parks. There are ninety-five acres of boulevards receiving park care, the most beautiful being Manning Boulevard, in the western section, with a fine driveway and bridle paths and walks on either side separated by lawns and stately trees. The city is building an extensive concrete pier on the water front, including recreation parks, boat landings, walks, a driveway, etc. Of its eighteen parks, Washington Park is the largest. It contains a lake six acres in area, the massive King Fountain representing "Moses Smiting the Rock," and a fine statue of Robert Burns, mounted on Aberdeen granite. Beaver Park, containing about eighty acres, has a charming driveway built through the rocky bed of an old stream.

Buildings. The most conspicuous feature of the city is the magnificent Capitol, of solid Maine granite, one of the most remarkable structures in the United States, erected at a cost of $25,000,000; the great western staircase alone cost nearly $2,000,000. The Military Museum, on the second floor, contains many relics of the wars of Secession and the Revolution. Opposite the Capitol is the new imposing State Education Building, which contains the administrative offices of the University of the State of New York, including the State Library of 450,000 volumes; and the State Museum. Other notable structures are the Federal building, state hall, city hall, state armory, a new one-million dollar courthouse, and a new high school. The interior of the State Hall is being extensively modified to make this building a state judicial building, in which the court of appeals of the state is to have its office and to hold court. Albany is noted for its many handsome churches, the most imposing being the Roman Catholic Cathedral of the Immaculate Conception, a Gothic structure with a seating capacity of 2,500; All Saints Episcopal Cathedral and Saint Peter's Church, the latter one of the oldest in the United States, Temple Beth Emeth, Saint Joseph's, Saint Paul's, the First Presbyterian (1763), First Reformed (1642) and Madison Avenue Reformed churches are all notable. Van Rensselaer Manor House, erected in 1666, Schuyler Mansion, in 1760, and Ten Broeck Mansion, in 1798, are buildings of historical interest.

Educational and Benevolent Institutions. In addition to the public schools, Albany has a State College for Teachers; the Albany Medical College, the Albany Law School and the Albany College of Pharmacy, which are departments in Union University, at Schenectady; the Convent of the Sacred Heart, Albany Academy for Girls, Albany Academy for Boys, Saint Agnes School (Episcopal), Dudley Observatory, Albany Institute and Historical and Art Society, and the Y. M. C. A. and

Y. W. C. A. Besides the state library there are twelve libraries containing nearly 525,000 volumes. The city also has Albany Orphan Asylum, Albany Hospital, built on the pavilion plan and covering sixteen acres (see HOSPITAL), and the new Saint Peter's and the Homeopathic hospitals.

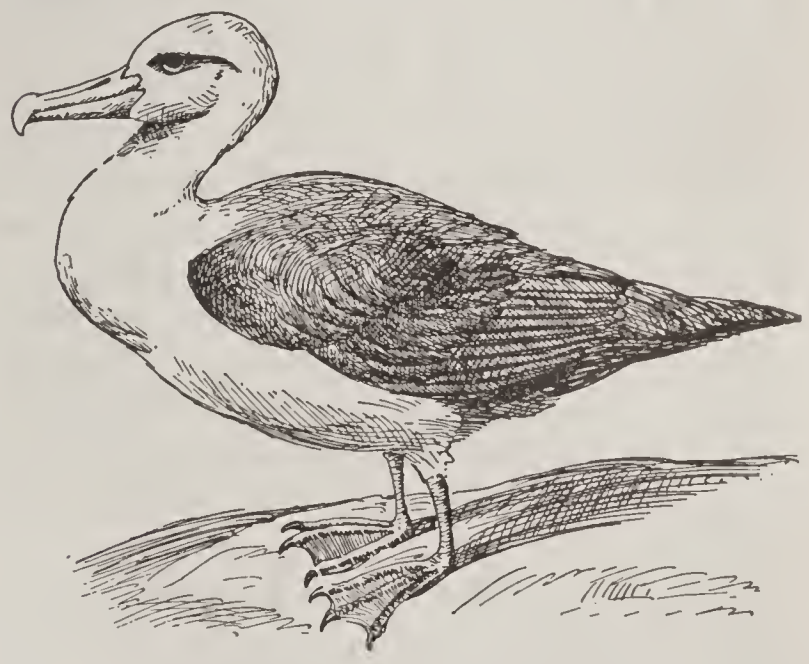
Commerce and Industry. The importance of Albany as a transfer point for traffic has been considerably lessened by through freight service, but it remains a prominent passenger center, distributing point and lumber port. The leading industrial plants of the city are iron and brass-works and manufactories of shirts, collars and cuffs, clothing, knit goods and tobacco products.

History. On the site of Albany was planted one of the oldest permanent settlements within the territory of the thirteen original states. Its historical interest is due to its strategic location during the conflict between the English and French in America and during the Revolutionary War. In 1624 some Huguenot refugees from Belgium, known as Dutch Walloons, settled here, and Fort Orange was built in the same year near the spot now occupied by the Capitol. In 1630 William Van Rensselaer bought a large tract of land around this settlement and sent a party from Holland as tenants; this settlement was annexed to Fort Orange in 1652. It was first named Fuyck, meaning *hoop-net,* on account of the bend in the river, where the settlement was made; later it became Beverwyck, and when New Netherlands was transferred to the English, the name was changed to Albany, in honor of the Duke of York and Albany, afterward King James II. In 1686 a city charter was granted. The most important of four Albany Conventions met here in 1754 to form "a plan of a proposed union of the several colonies." In 1797 the city was chosen for the capital of the state. From the opening of the Erie Canal in 1825 the growth of the city was rapid, the population increasing fivefold in less than four years. Albany has several times suffered heavy losses by fires, the most disastrous being those of 1797, 1848 and 1911; in the last-named year the state library of 500,000 volumes was destroyed.

Within recent years two city planners of national reputation have been employed to work out a general scheme for the beautifying of the city in building parks, boulevards and a water front, in modifying the electric light system, and in making other improvements. The city has either completed or has now under construction improvements, including repaving, to the value of $11,000,000. T.E.F.

ALBANY RIVER, a Canadian stream, one of the large rivers which drain the western part of Ontario. The river has its source in Lake Saint Joseph, about 180 miles north of Port Arthur, and flows in a general easterly direction for 600 miles, emptying into James Bay at Fort Albany, on its southwestern shore. About 150 miles from its mouth the Albany is joined by the Kenogami, its largest tributary, whose branches extend west and south to the shores of Lake Superior. The drainage basin of the Albany covers an area of 60,000 square miles, about one-sixth of the entire province of Ontario. The lower part of the river is navigable, but is little used.

AL'BATROSS, *al' ba traws* or *al' ba trahs,* one of the largest of birds that fly, is found in nearly all temperate parts of the ocean, but is chiefly at home in the Southern seas. It is regarded with superstitious veneration by sailors, and its destruction is supposed to be avenged with terrible disaster to the destroyer. The true albatross is a bird of great beauty, nearly all white on the body, with darker tail and wings; the latter have a spread of from ten to fourteen feet from tip to tip. Its power of flight is extraordinary. Day after day it will follow a ship, apparently never resting, feeding on refuse thrown from the vessel and on fish that rise to the surface of the sea.



Great albatross!—the meanest birds
  Spring up and flit away,
While thou must toil to gain a flight,
  And spread those pinions grey;
But when they once are fairly poised,
  Far o'er each chirping thing
Thou sailest wide to other lands,
  E'en sleeping on the wing.
CHAS. G. LELAND—*Perseverando.*

Its bill is heavy and powerful, more than four inches long, and strongly curved at the tip. Like most large birds, it is greedy in eat-

ing, and is readily caught with a line and hook baited with a piece of meat. The albatross seeks land only to breed, selecting some lonely island or desolate coast. One large white egg is laid on the ground, no nest of any kind being made. The young bird, which is hatched in about forty days, is covered with a sooty, fluffy down and does not acquire its beautiful plumage for several months. Four species of albatross are found on the Pacific coast of North America, but they are considerably smaller than the true albatross of the Southern ocean.

The most conspicuous reference to the albatross in literature occurs in Coleridge's poem, *The Ancient Mariner* (which see). E.T.S.

ALBEMARLE, *al' be marl,* **SOUND,** a great bay in the northeast lowlands of North Carolina, extending from the mouths of the Chowan and the Roanoke rivers eastward to the Atlantic Ocean, from which it is separated by a long island. Its length is about fifty-five miles, and its width from four to fifteen miles. The water is shallow and nearly fresh, and the sound is not greatly affected by the ocean tides.

ALBERT, Francis Charles Augustus Emanuel (1819-1861), the husband of Queen Victoria of Great Britain, known popularly as the *Prince Consort.* His rank of nobility was Prince of Saxe-Coburg-Gotha. He was born near Coburg, in Germany, and was educated under private tutors and at the University of Bonn. In 1840 he was married to Queen Victoria, with whom he lived most happily until his death.

ALBERT I (1875-), king of the Belgians since 1909, one of the most heroic and most pathetic figures of the twentieth century. At the end of July, 1914, King Albert was ruling in peace over a prosperous, peaceful nation; two months later he was still king of the Belgians, but almost the whole of his country was in the hands of invaders, and he, with the remnant of the Belgian army, was defending the last corner of Belgium over which the Belgian flag still waved. The War of the Nations made Albert the idol of his people. He personally commanded the Belgian army, resisted the German advance at every point, and, although repeatedly urged not to expose himself to the hardships and dangers faced by his soldiers, refused to yield the active leadership to others.

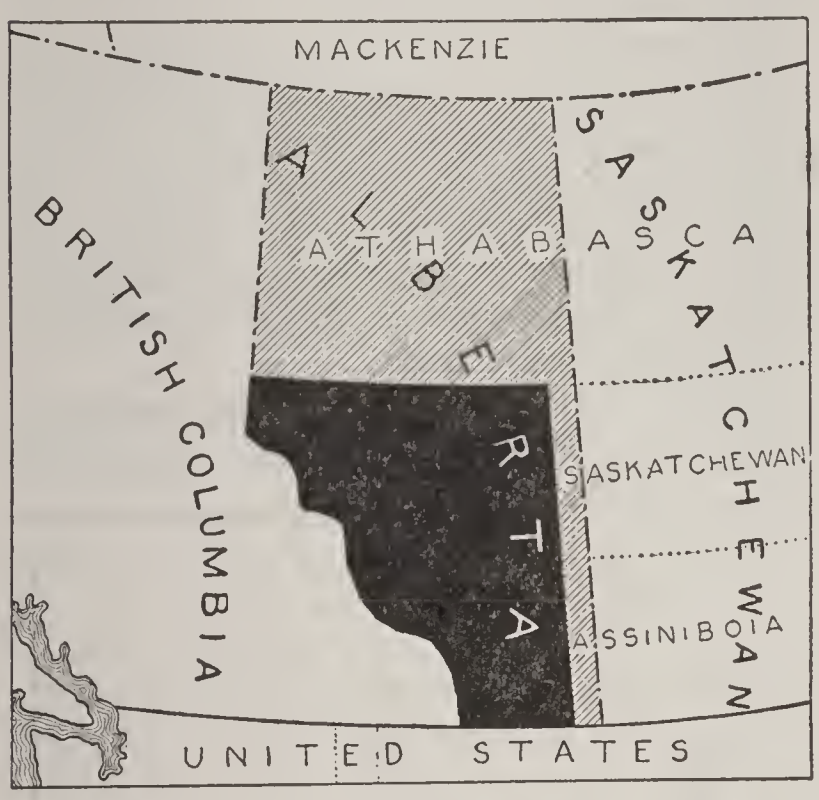
King Albert was born on April 8, 1875. He is the son of Philip, Count of Flanders, younger brother of King Leopold II, and the grandson of King Leopold I, the German prince who was elected king of the Belgians in 1831. He is a second cousin of King George V of Great Britain and Ireland and of former William II of Germany, and distantly related to former

KING ALBERT OF BELGIUM

King Ferdinand I of Bulgaria. At the death of King Leopold II, on December 17, 1909, Albert became king, because Leopold left no sons and his three daughters were excluded from succession by the Salic law (which see). As a boy Albert was carefully educated, and later made a special study of economics and social science. He traveled extensively, made a study of railways in the United States under the guidance of James J. Hill, and studied conditions in the Belgian Congo at first hand. Long before he became king his liberal and democratic inclinations were well known, and since 1909 have frequently shown themselves in the affectionate care he has lavished on his people.

King Albert's private life, unlike that of his predecessor on the throne, has been above reproach. On October 2, 1900, he married Princess Elizabeth of Bavaria, who was conspicuous at the outbreak of the War of the Nations for her courage and her loyalty to her adopted country. Their eldest child and the heir to the throne is Prince Leopold, born in 1901. There are two other children, Prince Charles, born in 1903, and Princess Marie-José, born in 1906. W.F.Z.

ALBER'TA, one of the nine provinces of the Dominion of Canada. Like all of the great Canadian Northwest, it was for 200 years, from 1670 to 1870, a part of Rupert's Land, the domain of the Hudson's Bay Company. Not until 1882 was the name Alberta given to any part of Canada. In that year the Governor-General, the Marquis of Lorne, and his wife, Princess Louise Alberta, daughter of Queen Victoria, paid an extended visit to Western Canada, and in honor of the Princess the name Alberta was given to one of the newly-organized districts of the Northwest Territories. The original district of Alberta, as shown on the accompanying map, comprised less than half of the present province. In 1905 the provinces of Alberta and Saskatchewan were erected from the area included in the four districts of Alberta, Assiniboia, Athabaska and Saskatchewan.



ALBERTA

Part in solid black is the former district of Alberta; part shaded in diagonal lines shows portions of other districts added to original Alberta to form the present province.

The boundaries of Alberta, as fixed by the Dominion Parliament, are the 60th parallel on the north, the 49th parallel on the south, and the 110th meridian (west) on the east; on the west the 120th meridian (west) is the boundary to the point where it intersects the main divide of the Rocky Mountains, which is the boundary thence southward. Thus Alberta's neighbors are the Northwest Territories, British Columbia, Saskatchewan and Montana.

Area and Population. The area of the province is 255,285 square miles, which is about 3,500 square miles larger than Saskatchewan or Manitoba. Alberta is nearly 50,000 square miles larger than either France or Germany, and has more than double the area of the British Isles. Of the states of the Union, only Texas, with 265,896 square miles, is larger. This vast province of Alberta is still sparsely populated. In 1901 it had only 73,000 inhabitants, but in 1905, when it became a province, the population was doubled. In the following decade the steady stream of immigration continued until the outbreak of the War of the Nations in 1914. Between 1905 and 1914 approximately 325,000 immigrants, from all parts of the world, made Alberta their new home. The Dominion census of 1911 gave it a population of 374,663, and the count for 1921 placed the total at 588,454. This census gave Alberta an average of 2.32 inhabitants per square mile, as compared with an average of 14.6 for Texas, 143 for France and 225 for the German Empire. Thus there is yet room for millions of people in this inland empire.

Of the total population, about one-fourth is of English birth or descent. Another fourth includes Scotch, Irish and other British. The remaining half includes Germans, Austrians, Scandinavians, French, and many other nationalities and their descendants. The American-born population, much of which is included in the divisions already mentioned, totals about 100,000.

The urban or town population of Alberta is growing rapidly, but it does not yet equal the rural population. About forty per cent of the total is now found in cities or towns. The largest city is Calgary; Edmonton, the provincial capital, is next in size. Lethbridge, Medi-

cine Hat, Wetaskiwin and Red Deer rank in the order named. These are more fully described under their titles.

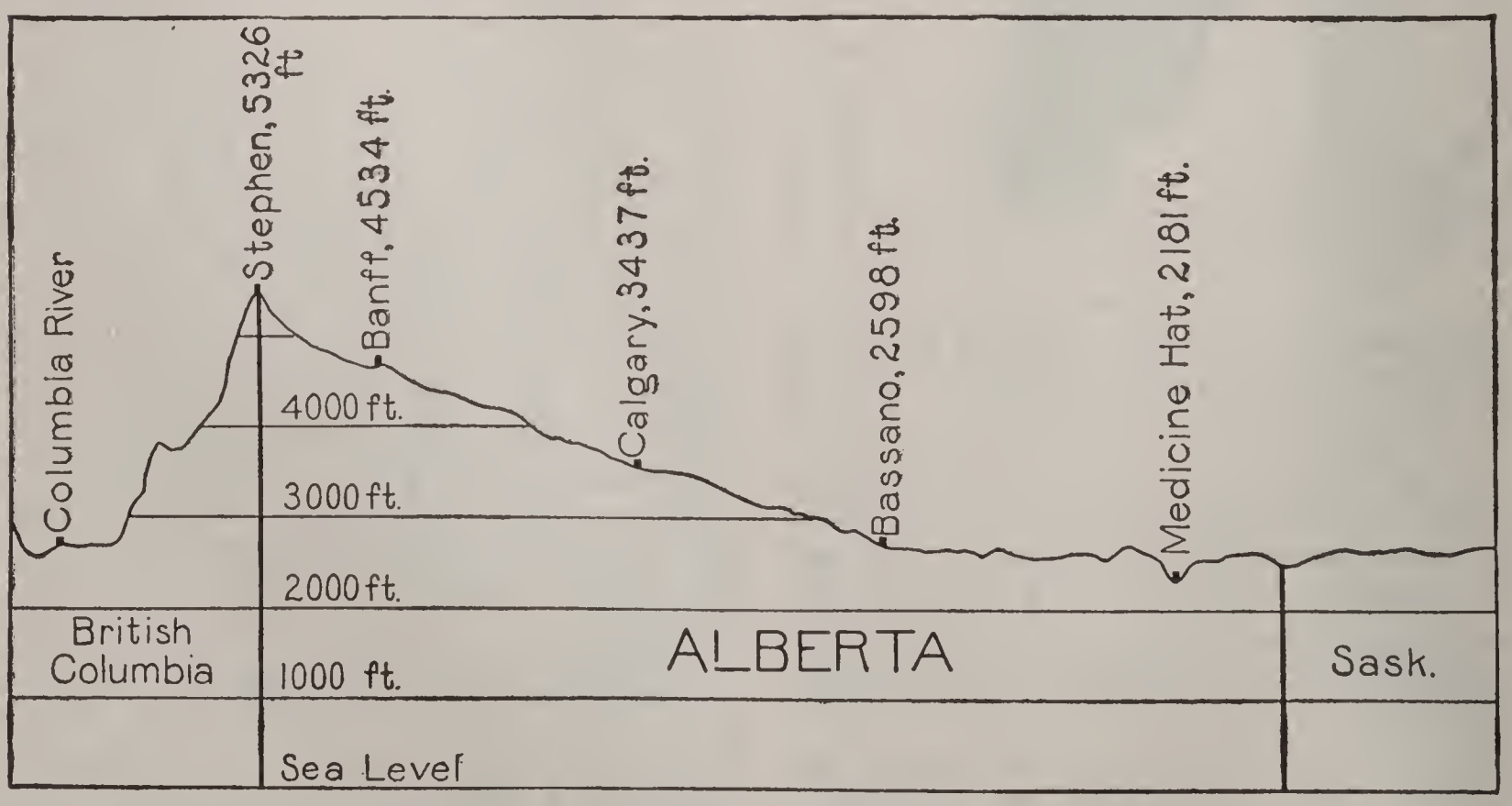
Size of Alberta, as compared with the area of the entire Dominion of Canada.

Physical Characteristics. The western boundary of Alberta, for part of its length, is the main divide of the Rocky Mountains, whose snowy peaks are Western Alberta's distinctive feature. Many of them have altitudes of 10,000 feet or more, and a few of the peaks exceed 12,000 feet, notably Mount Columbia and Mount Alberta. Mount Assiniboine, a famous peak, reaches 11,830 feet. On clear days the mountains are visible from the plains 100 miles to the east.

The eastern slope of the Rocky Mountains is very gradual, and many foot-hills soften the outlines of the peaks. East of the mountains and their foothills Alberta is a part of the Great Central Plain of North America. As far as the eye can see, in every direction, are undulating prairies, with here and there a low, treeless ridge. The only striking surface features are the deep-set river channels in narrow valleys which descend to a depth of 100 to 300 feet below the level prairie or bench land. The southern part of the prairie has little native vegetation except grasses, with light scrub growth in the shelter of the coulees and with cottonwoods along the river bottoms. The rainfall is not abundant, and the moisture is quickly evaporated by the warm, dry winds from the west (see CHINOOK). By reason of its mild winter climate and naturally cured grasses, this area was formerly devoted to ranching, but by special methods suited to the conditions the whole of the country is being brought under cultivation. Irrigation is practised on lands tributary to Calgary, Lethbridge and Medicine Hat. Snowfall is not heavy in any part of the province, and in the south seldom lies throughout the winter.

In the central and northern part of the province the rainfall is slightly heavier and the evaporation less rapid than in the south. Vegetation, too, is heavier and more varied. The central part is diversified by poplar and willow bluffs, and farther north there is considerable timber in scattered blocks, chiefly in the lower parts of the river valleys.

Climate. As Alberta is 750 miles long from north to south, and has a maximum width



ELEVATION OF ALBERTA

Lowest point shown is at Medicine Hat, 2,181 feet above sea level. The highest elevation is on the western boundary, 5,326 feet. (Along the line of the Canadian Pacific Railroad.)

more than half as great, considerable variations in climate are not astonishing. From the northern to the southern boundary is as far as from New York City to Charleston, South Carolina, and is almost as far as from San Francisco to Portland, Oregon. The province may be divided into three climatic parts, each about 250 miles long from north to south, each possessing a characteristic climate. The southern third, which includes such well-known places as Medicine Hat, Calgary and Banff, has a moderate, changeable climate, with an average, or mean, winter temperature of 14° to 16° F. This is perhaps four or five degrees lower than the mean winter temperature for Northern Illinois.

The central section of Alberta, of which Edmonton may be taken as a center, has an average annual temperature about the same as that of Minneapolis. The mean winter temperature at Edmonton is about 10° F. The northern third has a severe climate, with the temperature hovering around zero during most of the winter. This region is usually called sub-arctic, but its low altitude, only 600 feet above sea level, gives it an average summer temperature less than two degrees lower than that of Edmonton and Calgary. Throughout the province differences in altitude produce marked variations in temperature.

While the climate of Alberta, in common with that of the other prairie provinces, is usually said to be extreme, the inner slope of the Rocky Mountains is affected by warm western winds along its whole length. The effect is not so great in Central or Northern Alberta as it is under the strong Chinooks of Southern Alberta, but it is sufficient to make cultivation possible far north in the valley of Peace River (which see), and this area is being rapidly settled.

Drainage. There are three great river systems represented in the drainage of the province. In the extreme south is the Milk River, a tributary of the Missouri-Mississippi system. With this exception the entire drainage may be divided into two parts, the Saskatchewan and the Mackenzie systems, both of which have their origin on the Alberta slope of the Rocky Mountains. Between these two systems is a height of land, or watershed, running in a northeasterly direction between 53° and 54° N. South of the watershed the land slopes gradually to the east and is drained by the two branches and numerous tributaries of the Saskatchewan. North of Edmonton the slope is more to the north, and here the waters are carried away by the Athabaska and Peace rivers, the great tributaries of the Mackenzie (see MACKENZIE RIVER; SASKATCHEWAN RIVER).

There are numerous small lakes in Alberta, most of them either the sources or enlargements of rivers. The largest of these are Lesser Slave Lake, with an area of 480 square miles, and Lake Athabaska, of whose total area of 2,842 square miles about one-third is in Alberta and the remainder in Saskatchewan.

Natural Resources. Nearly 190,000 square miles, seventy-five per cent of the total area of Alberta, are suitable for cultivation. The soil is generally fertile, and though subject to variations in yield on account of differences in rainfall, produces good crops. The best soil is found in the central section, and consists chiefly of black vegetable mould from one to three feet deep.

ALBERTA

Map indicates boundaries, chief rivers, principal towns, highest point of land in the province and most important coal fields.

The dryness of the southern part and the sub-arctic character of the north limit the lux-

uriance and to some extent the variety of plant life. Nearly all sections are covered with a large variety of native grasses. The south is a short-grass country, in which the growth cures naturally on the stem. In the center the growing period is longer and the top of vegetation more luxuriant. To the grasses are added the sedges and a great variety of legumes, shrubbery, wild fruits, and "bluffs" or groves of light tree growth, commonly called pole timber. The prairie is studded with a rich growth and succession of wild flowers for more than half the year. The heavier timber of the north includes fir, poplar, birch, jackpine, spruce and balsam.

Animal Life. The plains were once the home of countless thousands of buffaloes, or bisons. But wild herds were rapidly exterminated in the early seventies through the demand for buffalo skins established by white traders from Fort Benton. In the mountains and woods are grizzly, black and brown bears, and the coyote's howl is familiar almost everywhere. Because many of their haunts are inaccessible to man, mountain sheep and goats are still numerous, and elk, antelope and red deer are common, and even the lordly moose, monarch of the forests, is frequently seen. Among other animals are the lynx, mountain lion, porcupine, squirrel and rabbit.

Farther to the north the fur hunter still follows the traditional occupation of the northland, and ermine, otter, beaver, mink and marten reward his labors. The north is also the home of the musk-ox, and is the nesting-ground for ducks, geese, swans and other migratory birds. The eagle, crane, partridge, hawk, owl and crow are plentiful. The lakes and rivers are well stocked with fish, pike, pickerel and whitefish being most abundant. In the mountains the brook trout lures the sportsman.

A policy of strict conservation is being followed with respect to the desirable wild life of the province. Five parks are administered by the Dominion Commissioner of Parks, and in these the animal and plant life is fully protected. Rocky Mountains Park and Jasper Park are great national resorts as well as game and forest preserves. At Wainwright, Buffalo Park and Elk Island Park a herd of 5,000 prairie buffalo and a considerable number of moose, elk, deer and antelope are held. See, also, Rocky Mountains Park.

Mineral Wealth. Below the surface of the earth Alberta has resources which are perhaps as important, if not as varied, as those which it possesses above ground. Huge beds of bituminous sand are found along the banks of the Athabaska, within 60 miles of Fort McMurray. Salt and gypsum are also found along the Peace and Slave rivers. Within the city of Medicine Hat and at other points near, natural gas for both domestic and commercial purposes is plentiful. Considerable supplies that have not yet been set to work exist in the north of the province. Evidences of oil are still more general and promising, but the province is still in the exploration stage so far as this product is concerned.

By far the most important of all the minerals in Alberta is coal, the province containing about 17% of the coal reserves of the world and about 80% of the reserves of Canada. Practically all of the southern half of the province is underlaid with coal measures, though only a small proportion of the area includes high-grade coal. Even where the coal is not good enough to repay the cost of transportation to a distance, it supplies local demand; this is especially true of the lignite. The most valuable deposits of bituminous and semi-anthracite coal are found in the Rocky Mountain area. (See Coal, for map of Canada's coal deposits.)

Industries. *Farming and Ranching.* These are the leading industries. There are about 1,500,000 head of cattle in the province, besides 500,000 milch cows. Dairying is important in the central part of the province, and is rather highly specialized in the sections tributary to Edmonton and Calgary. The cows are mostly Holsteins, Ayrshires and Jerseys; the beef cattle are largely Shorthorns and Herefords. The raising of horses is an important branch, and their number seldom falls below 920,000. The soil, grasses and climate are highly favorable to this industry. Alberta horses are famous for their endurance and generally sound constitutions. During the War of the Nations large numbers of them were sent to Europe for the use of the allies. The raising of sheep is a minor industry, but hog-raising is steadily increasing in importance.

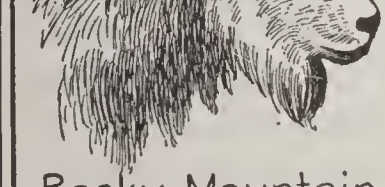
The growth of farming since 1901 is remarkable. In that year Alberta had 9,486 farms, occupying about 2,700,000 acres. In 1911 these figures had risen to 61,500 and 17,751,000 respectively. The value of the land occupied by farms increased in the same decade from $13,156,000 to $344,759,000, an increase in the ratio of one to twenty-six. Hardly less astonishing is the increase in the value of field crops, including wheat, oats, corn, barley and

A familiar scene in Alberta

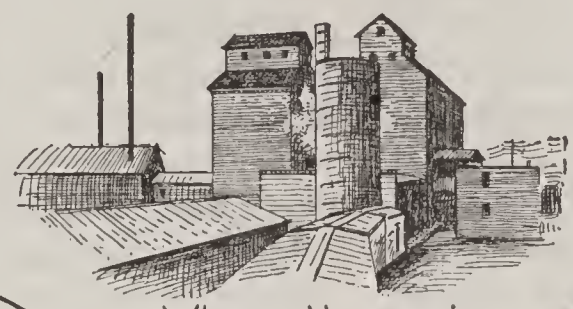
Jasper Park

A natural gas well burning at night

ALBERTA



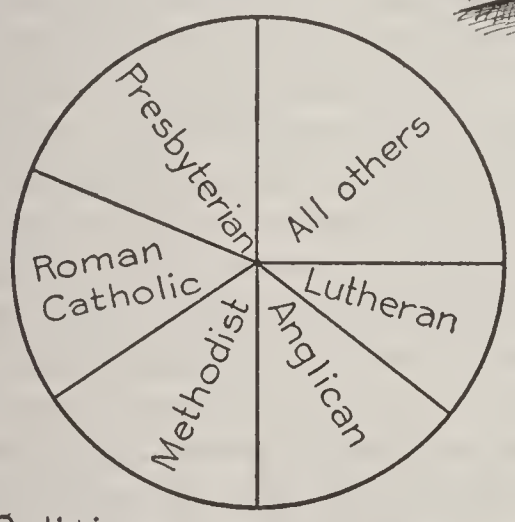
Rocky Mountain white goat



Where the grain is stored

Moose

Farm animals



Religions

Parliament building, Edmonton

hay. The value of all crops in 1921 was considerably over $200,000,000. The field crops in that year exceeded in total wealth any previous year in Alberta's history.

The most valuable crop is wheat, whose average annual production is about 60,000,000 bushels. The oat crop is larger, usually between 85,000,000 and 95,000,000 bushels, but its value is slightly less than that of wheat. Barley, flax, potatoes, hay and alfalfa are other large crops. Some attention is now being given to garden vegetables and to orchard fruits, especially apples. Sugar beets are cultivated chiefly near Raymond, where there is a factory for the extraction of the sugar.

Irrigation. To some extent irrigation has been practised in Southern Alberta since this section was first settled, but the works were crude and the irrigated tracts were small. After the passage of the first Dominion irrigation law in 1894, there was for a few years a considerable development of irrigation in the districts east of Calgary and east of Lethbridge. Since 1910 there has been a large enterprise established west of Medicine Hat.

The greatest of all the 400 or more irrigation projects in the province is that undertaken by the Canadian Pacific Railway. The tract under irrigation consists of 3,000,000 acres along the company's main line between Calgary and Medicine Hat. Water for this area is taken from the Bow River; for the western section it is diverted near Calgary, and for the eastern section at the Horse Shoe Bend, near Bassano. The Lethbridge enterprise now also belongs to the Canadian Pacific Railway. Irrigation, far from encouraging large one-crop farms, makes possible three desirable results—diversified farming, rotation of crops and intensive cultivation. Renewed interest in irrigation was shown in 1921, the provincial government guaranteeing two projects which aim to utilize the waters of Old Man and Belly rivers. Alfalfa is the most important of all the crops that are grown thus far on the irrigated lands of Alberta.

Mining. The richness of Alberta's mineral deposits naturally makes mining one of the great industries. The production of placer gold, which amounted to an average of $50,000 a year about 1895, is now insignificant. Lead and silver are mined in small quantities, and natural gas and oil are found in many parts. Calgary, Macleod, Lethbridge and other cities are supplied with natural gas piped from Bow Island, about thirty miles southwest of Medicine Hat. Farther north, in the vicinity of Viking, wells have been drilled for the purpose of providing a supply for the city of Edmonton. Gas has been flowing into the air under great pressure since the year 1897, from a well at the mouth of the Pelican River, in the northern section of the province. Natural gas and petroleum were discovered in 1913 near Calgary, but their value is still a matter of speculation.

The coal production of Alberta, if due allowance is made for labor troubles, is making steady progress, the output now exceeding that of any other province in the Dominion. The average yearly output, 7,000,000 tons, is about five times that in 1905. A small quantity, not over 150,000 tons, is anthracite; about 3,400,000 tons is lignite, and the balance is bituminous.

Manufactures. The manufacturing interests are rapidly growing. Slaughtering and meat packing is the first in importance, but a close second is the flour and grist mill industry. These two industries combined furnish about one-fourth of the total of $80,000,000 worth of manufactures. The industries dependent on lumbering form a third important group, with an annual output which usually reaches a total of $10,000,000. Minor industries include the making of brick and tile, butter and cheese, malt liquors and bakery products.

Means of Travel and Communication. Lack of railway communication left the Northwest Territories for many years with the characteristics of a frontier community. In 1871, when British Columbia became a part of the Dominion, one of the conditions on which it insisted before joining was the construction of a transcontinental railway. This railway, the Canadian Pacific, was complete in 1885, thus giving Alberta rail connection with the rest of the Dominion. In the following twenty years there was little additional construction. In 1905, when Alberta became a province, the Canadian Pacific was still the only railway; besides the main line there were two important branches, linking Calgary with Edmonton and Macleod. The total mileage was 1,060. There are now three great transcontinental railways crossing the province, with a total mileage, including branches, of about 4,500. Contracts and surveys already made by the railways call for the construction of an additional 4,500 miles in the near future. See CANADA, subhead *Transportation.*

The telephone and telegraph systems have kept pace with this rapid increase in transportation facilities. Wherever the railroad goes

the telegraph is sure to follow, and Alberta has practically an equal mileage of railways and telegraphs. It has about 50,000 telephones in use, a ratio of one telephone to every eleven or twelve of population. Only in the United States is the telephone as much used. The telephone system is owned and operated by the provincial government.

Government. The government of Alberta, like that of Saskatchewan, was organized by authority of the Dominion Parliament in 1905. The formal inauguration of provincial government took place on September 1, in the presence of Earl Grey, then Governor-General, and Sir Wilfrid Laurier, Premier of the Dominion.

The Legislature. Alberta is now represented in the Dominion Parliament by four Senators, and in accordance with the census of 1911, is entitled to sixteen members in the House of Commons, but the last Parliament, which opened in 1922, had only twelve members. The legislative powers of the province are exercised by an assembly of sixty-one members, whose enactments require the approval of the Lieutenant-Governor.

The Executive. The Lieutenant-Governor is the chief executive, as the representative of the Governor-General of Canada, and indirectly as the representative of the sovereign of the United Kingdom. He is appointed by the Governor-General in Council for a term of five years, and receives an annual salary of $9,000. The actual administration of departments is in the hands of an executive council of eight members, one of whom is premier. Members of the council must hold seats in the legislative assembly, and are responsible to it for their acts. If the ministry loses the confidence of the assembly, it has no course open to it but resignation.

Provincial Finance. The provincial revenue is derived mainly from three sources—a Dominion subsidy, the sale of public school lands, and a tax on corporations. The first of these is by far the largest, now amounting to $1,500,000 a year. It includes a fixed appropriation of $50,000, an allowance of eighty cents per head of population, and a number of other items. The sale of public school lands adds about $200,000 a year to the revenue, and the tax on banks, loan and trust companies, railways and other corporations about an equal amount. Interest, fees, and miscellaneous sources bring the total provincial revenue to an average of $10,000,000 a year.

The Courts. Besides the Dominion courts, which have jurisdiction in Alberta, there are a number of courts established by authority of the province, namely, the supreme and district courts. For minor offenses of a criminal nature there are local justices of the peace or police magistrates. The jurisdiction of the district courts is practically universal, except in civil suits involving more than $600. By mutual consent of the parties, however, such cases may be tried by the district judge. The district courts are held at Edmonton, Wetaskiwin, Calgary, Macleod, Lethbridge, Red Deer, Bassano, Taber, Medicine Hat, Peace River, Camrose, Grande Prairie, and Stettler. The supreme court of Alberta is composed of eleven members, five in the appellate division, six in the trial division, with a chief justice and eight *puisne,* or associate, judges in each division. It has practically unlimited original and appellate jurisdiction. This court also decides any legal and constitutional question submitted to it by the Lieutenant-Governor. It has been given power to grant divorces.

Local Government. The general superintendence of local government is in the hands of the Minister of Municipal Affairs, a member of the Executive Council of the province. Rural communities and towns are governed under provincial acts. The rural municipality has a council including a reeve and five councillors, and a town has a mayor and six councillors. The affairs of incorporated cities are regulated by special charters.

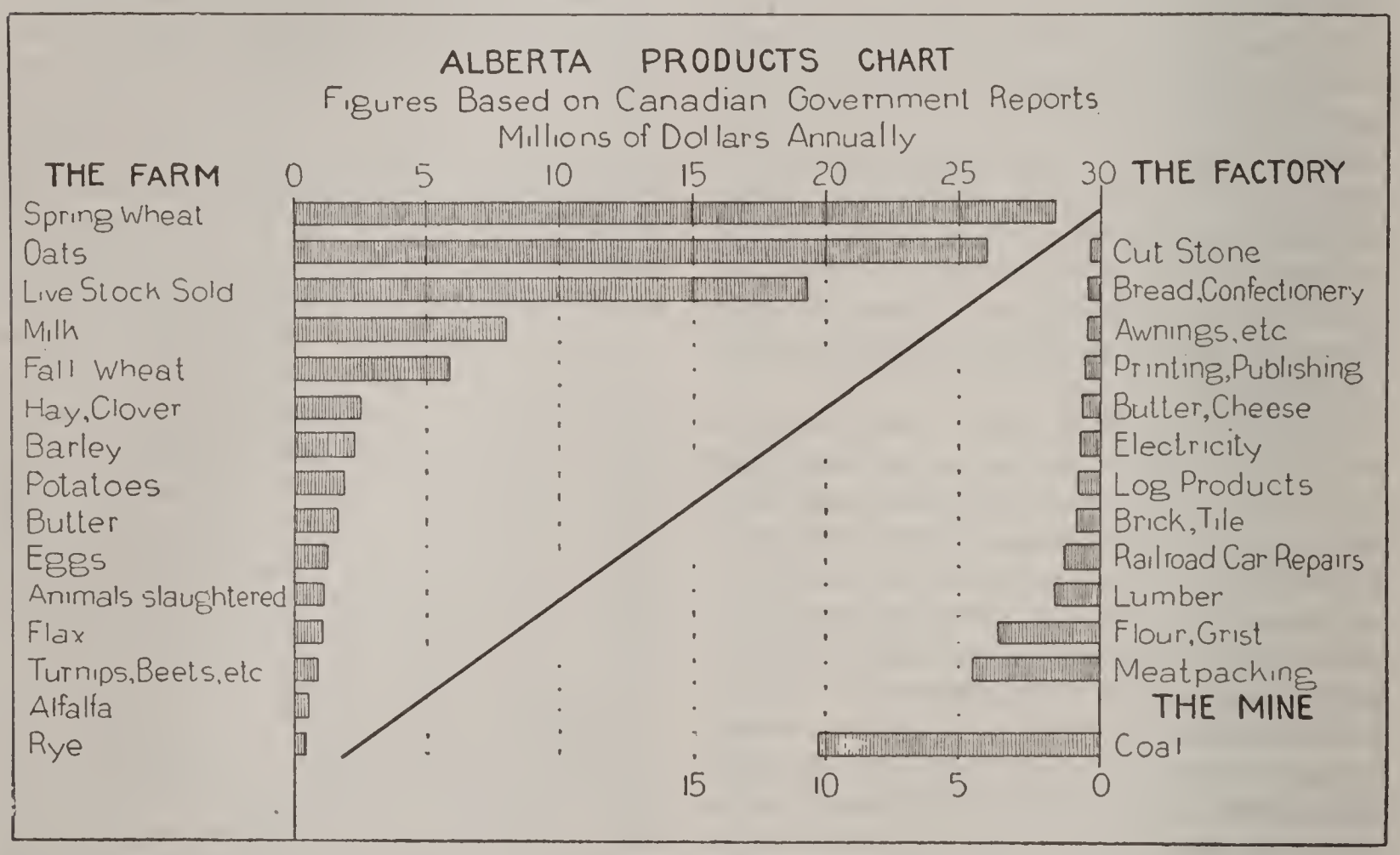
Education. The unit of education in Alberta is the school district, and there are over 3,200 of these. The district is usually about four miles square, and may be organized as soon as it has four taxpayers and eight children of school age. The local school boards, elected by the voters, are under the general direction of the provincial Department of Education. The schools are supported partly by local taxation and partly by grants from the government. About 122,000 children are enrolled in the public schools.

Technically speaking, there are no high schools in Alberta, but in common speech the name public school is given to those offering instruction in grades one to eight, and the name high school to those offering instruction in grades nine to twelve. The aim has been to make an almost imperceptible transition between elementary and secondary schools. To this end, all schools in a district are under the control of a single school board. Three

normal schools, at Calgary, Edmonton and Camrose, are maintained by the province.

There is a distinct tendency to supplement the older academic system by vocational and technical work. In agriculture, the scope of the work in the public schools has been suitably defined, a system of secondary or trade schools in agriculture is administered by the provincial department of agriculture, and a faculty of agriculture has been established in the provincial university. In Edmonton, Calgary, Medicine Hat, Lethbridge and other cities technical work is established.

To cap the public school system the provincial University of Alberta (which see) was



SOURCES OF ALBERTA'S WEALTH, IN AMOUNTS FOR AVERAGE YEARS

established at Edmonton in 1910. Affiliated with it are Alberta College (Methodist) and Robertson College (Presbyterian). The other institutions for higher education are numerous and excellent, and include the Provincial Institute of Technology at Calgary, the Lutheran College at Camrose, Mount Royal College (Methodist) and Western Canada College, both at Calgary.

History. As told above, the name Alberta was given to a district of the Northwest Territories in 1882. Calgary was founded in the next year, and the completion of the Canadian Pacific Railway in 1885 gave a new impulse to settlement. As other communities soon dotted the plains, a demand arose for self-government, but not until 1905 was this demand granted by an act of the Dominion Parliament creating the provinces of Alberta and Saskatchewan.

The formal legal installation of the new provincial officers took place on September 1, 1905, Hon. George H. V. Bulyea being the first Lieutenant-Governor, and Hon. Alexander Cameron Rutherford the first Premier. The first legislature met in 1906 at Edmonton, which was fixed as the capital. The year 1909 marked the completion of the Grand Trunk Pacific Railway from Winnipeg to Edmonton, and also the purchase by the government of all the telephone lines in the province.

In the year 1910 Premier Rutherford, who was likewise Minister of Railways, resigned on account of the criticism from members of both parties of the method and terms of guaranteeing the securities of the Alberta & Great Waterways Railway. Arthur L. Sifton, chief justice of the province, was called upon to form a government. These were both Liberal governments.

The province had advanced liberal subsidies to the railway company, and had guaranteed its bonds. The Sifton government, claiming that the company was not fulfulling its contract, attempted to withdraw $7,400,000 which was deposited in several Edmonton banks to the credit of the company. The effect of this act would have been to place the railway under provincial control, but after the case had been carried through the lower courts, the

Judicial Committee of the Imperial Privy Council decided that the government could not seize these funds. Thereupon the government contracted with a private syndicate for the completion of the railway, a course which was severely criticised by the Liberal opposition as being a complete reversal of the Premier's policy. Premier Sifton also attempted to reverse the policy by which the Canadian Pacific Railway was relieved of taxes on over $60,000,000 worth of property, but the Privy Council again decided against the government. The exemption, which dates from the organization of the company, was still in force at the beginning of the year 1917.

A startling development in 1913 and 1914 was the great oil "boom" in the Calgary district. Oil of excellent quality was first discovered in the now famous Dingman Well at Okotoks in October, 1913, and in the next year other wells were bored. The suddenness of the discovery was equalled by the enthusiasm of investors and promoters. As usual under such circumstances a few investors made large fortunes, and many others placed their money in speculative companies. By August, 1914, there had been incorporated over 400 companies, with a total capitalization of $383,000,000. At the height of the boom stocks rose over night from a price of ten cents or twenty-five cents to several dollars a share, and the stock of one company was quoted at eighteen times its par value. The inevitable reaction which set in at the end of 1914 caused the failure of most of the companies which had been formed on a speculative basis. The undoubted fact, however, is the presence of petroleum of good grade, and in time the field should be of great commercial importance.

In 1915 the people of Alberta were called on to decide whether or not the province should have prohibition. For months the issue was debated in the public press, at public meetings and in pulpits. By a vote of 50,000 to 30,000 the voters decided for prohibition, and on June 30, 1916, every hotel bar in the province closed its doors. The sale of liquors is now conducted through government vendors under strict regulations. In 1916 an act of the legislature placed women on an absolute equality with men with respect to political rights and privileges as well as penalties and disabilities. J.MC C.

In 1917 Premier Sifton resigned, to become Minister of Customs in the Federal government, and was succeeded by Hon. Charles Stewart. In July, 1921, the Stewart government met defeat at the polls, and was succeeded by a government under the leadership of Hon. Herbert Greenfield.

Additional Items of Interest. The Marquis of Lorne wrote this sonnet to his wife, Princess Louise Alberta, for whom the province was named:

In token of the love which thou has shown
For this wide land of freedom, I have named
A province vast, and for its beauty famed,
By thy dear name to be hereafter known.
Alberta shall it be! Her fountains thrown
From Alps unto three oceans, to all men
Shall vaunt her loveliness e'en now; and when,
Each little hamlet to a city grown,
And numberless as blades of prairie grass,
Or the thick leaves in distant forest bower,
Great peoples hear the giant currents pass,
Still shall the waters, bringing wealth and power,
Speak the loved name—land of silver springs—
Worthy the daughter of our English kings.

Baseball games are called after supper in Alberta. In the southern part from seven to nine or nine-thirty o'clock is the regular time, but at Edmonton the day is almost an hour longer and the games may be correspondingly later.

The *coulées* constitute a noticeable feature of the great prairie region of Alberta. These are steep ravines which run into all the river valleys at right angles. Of old, they were stream beds.

The Rocky Mountains Forest Reserve has an area as great as that of New Hampshire and Vermont combined.

Lake Louise, in Rocky Mountains Park, is one of the most famous beauty spots on the continent, and is visited annually by thousands of tourists.

Four passes lead over the mountains in Alberta. They are picturesquely named Crow's Nest Pass, Kicking Horse Pass, Yellow Head Pass and Peace River Pass.

Tens of thousands of bisons were killed between 1879 and 1882 on the prairies of Southern Alberta, when the land was being prepared for the coming of the Canadian Pacific Railway.

There are in Alberta over 11,000 Indians, largely Crees and Blackfoots. They live on reservations scattered throughout the province.

The Roman Catholics surpass in number any other religious denomination, except the Presbyterians. Methodists and the Church of England rank next, in that order.

There are over 3,000 Mormons in the province, but they are not of the type that preaches or practises polygamy.

Throughout the country drained by the

RESEARCH QUESTIONS ON ALBERTA

(An Outline suitable for Alberta will be found with the article "Province.")

How did Alberta get its name?

What is a *coulée?*

Why has Alberta no more great herds of bison?

What was the percentage of increase in population between 1901 and 1911?

How many Canadian provinces are larger than Alberta? How many states of the United States?

If all the inhabitants of Canada were transferred to Alberta, would the density of population be greater or less than that of the United States?

What is meant by a "muskeg"?

Explain the statement, "The climate makes the country, and the chinook makes the climate."

Name four passes across the Rocky Mountains in Alberta.

How large is Rocky Mountains Park?

Of what larger reservation is it a part?

Does the larger part of Alberta's population live in towns or in the country?

Give statistics to show the marvelous growth of Alberta's largest city.

How many provinces have fewer people to the square mile than Alberta? How many states of the United States?

What part of Alberta can well be called the "Switzerland of America"? Why?

What natural advantages has Alberta that fit it especially for the raising of cattle and horses?

Which is the largest lake in the province? Which is the most beautiful?

How many acres are suitable for cultivation?

Why is Alberta still known as a "sportsman's paradise"?

About what is it estimated that the horses of Alberta are worth?

What percentage of increase was there in the number of farms in the province between 1901 and 1911?

How many children must there be in a district before it can be organized for school purposes?

In what way, besides the sending of troops, was Alberta able to help Great Britain in the War of the Nations?

How does the amount of wheat raised in Alberta compare with that raised in Iowa?

Compare, as to value, the coal production with its production of wheat; its lumber with its slaughtering industry.

What interesting new industry is growing up near Edmonton?

How important a problem is the "divorce-evil" in Alberta?

What is the greatest irrigation project in Alberta?

What percentage of increase has there been in railway mileage since Alberta became a province?

How do Alberta's facilities for telephone communication rank with those of the other provinces? With those of other countries?

In which direction does the watershed run?

About how many acres of cultivable land has Alberta?

What have been the results of irrigation?

Athabaska there are mossy swamps, called "muskegs." These, when drained, furnish excellent farming land.

From 1906 to 1914 there were but fourteen divorce cases in Alberta. Divorces can be obtained only by special act of Parliament.

So rapidly are towns springing up that there exists among them a rivalry as to which shall rank as "the best new town of the year."

Some agriculturists pronounce the soil of Alberta the most fertile in the world.

The Alpine Club, which has its center at Banff, is doing all it can to increase interest in mountain climbing. It has 1,000 members.

At Fort Vermilion, less than ten degrees from the Arctic Circle, farming has been carried on for years, and the production of wheat is on the average twenty-one bushels to the acre. This is more than is usually grown on the same area in North Dakota or Kansas, the greatest wheat states of the United States.

Consult Thwaites' *Alberta: Its Wealth and Progress.*

Related Subjects. The following articles contain much detailed information which will supplement the general material given in the article above:

CITIES AND TOWNS

Athabaska
Banff
Bassano
Blairmore
Calgary
Camrose
Cardston
Coleman
Dunvegan
Edmonton
Grouard
Lacombe
Lethbridge
Macleod
Medicine Hat
Raymond
Red Cliff
Red Deer
Stettler
Taber
Vegreville
Wetaskiwin

HISTORY

Athabaska
Hudson's Bay Company
Royal Northwest Mounted Police
Rupert's Land

LAKES

Athabaska
Lesser Slave
Louise

MOUNTAINS

Assiniboine
Athabaska
Columbia
Hooker
Marchison
Rocky Mountains

PRODUCTS

Cattle
Coal
Fur
Horses
Petroleum
Wheat

RIVERS

Athabaska
Peace
Saskatchewan

UNCLASSIFIED

Alberta, University of
Rocky Mountains
Rocky Mountains Park

ALBER'TA, UNIVERSITY OF, a non-sectarian, coeducational institution of learning. It was established by act of the provincial legislature in 1906, and the first classes were held in the autumn of 1908. The government of the university is divided between a board of governors, whose functions are those of business management and administration, and a senate, which is entrusted with the supervision of the educational work, including the discipline of students. The president and the chancellor, together with nine members appointed by the lieutenant-governor-in-council, constitute the board of governors. The governors are *ex officio* members of the senate, which also includes the heads of affiliated colleges, the deans of the faculties, the superintendent of education for the province, and others.

Instruction was at first provided only by the faculty of arts and sciences, but the law faculty was created in 1912, the faculties of applied science and of medicine in 1913, and the faculty of agriculture in 1915. From the beginning a noteworthy feature of the university's activities has been the extension work, and in 1912 it was recognized and organized as a department.

The university is located in Edmonton, on the south banks of the Saskatchewan River, immediately opposite the provincial legislative buildings. Athabaska Hall, Assiniboia Hall, Pembina Hall and the main University Hall are noteworthy buildings. Strathcona Hospital, though built by the city of Edmonton, is on the university campus and provides clinics for the medical school. In affiliation with the university are Alberta College, the Methodist theological training school, Robertson College, the Presbyterian training school, and several other colleges and preparatory schools. There are about 100 professors and instructors on the university's staff, and over 1,100 students.

ALBERT EDWARD NYAN'ZA, a lake covering an area of 820 square miles, on the boundary between Belgium Congo and Uganda, in Central Africa. It is one of the principal sources of the River Nile. It was discovered by Henry M. Stanley in 1876 and named in 1889 after the Prince of Wales, later King Edward VII. Semliki River carries its surplus waters into Albert Nyanza through a valley in the Ruwenzori Mountains, which were explored by the Duke of Abruzzi in 1906. It lies in a volcanic region remarkable for the number of lakes formed in extinct craters, and also for numerous geysers. Fish abound, and crocodiles and hippopotami are found in the surrounding

swamps. In the dry season the lake is obscured by overhanging haze caused by evaporation. *Nyanza* is a Bantu word meaning *lake,* and is applied in conjunction with other names to many central African lakes.

ALBERT NYAN'ZA, or Albert Lake, for *Nyanza* means *lake,* lies in Central Africa, about 2,400 feet above sea level, and is 100 miles long and twenty miles wide. It is connected with Albert Edward Nyanza by the Semliki River, with the Victoria Nyanza by the Victoria Nile, and the White Nile issues from its northern extremity. The lake abounds with fish and here are found also in great numbers the crocodile and hippopotamus. It was discovered in 1864 by Sir S. Baker, and named after Albert, consort of Queen Victoria.

ALBIGENSES, *al bi jen 'seez,* so-called from their chief stronghold, Albi, a religious sect which sprang up in the south of France during the thirteenth century. Their beliefs and practices were so different from those of the Church of Rome that Pope Innocent III preached a crusade against them. This, however, did not win them back to the Church fold, and, after they had killed the Pope's messenger, Peter of Castelnau, war against them began in 1209. Peace was made in 1229, after many thousands on both sides had perished. Later outbursts of rebellion were quelled and the sect disappeared.

ALBINO, *al by' no,* a human being or other animal whose skin, hair and eyes show radical differences from the normal because of the absence of pigment, that is, dark coloring matter. The condition may be inherited. A human being who is a complete albino has pale, milky-white skin, white hair and pinkish eyeballs. The latter condition is due to the fact that the red blood of the capillaries shows through the transparent cornea, iris and retina (see EYE); in normal beings it is concealed by the coloring. Also in normal eyeballs the coloring matter diminshes the intensity of the light which falls on the retina, but an albino is not thus favored and must keep his eyes nearly closed in the sunlight. Albinism may be partial or complete, and though prevalent among Indians and negroes, may occur in any race. Among the lower animals, white mice, white rabbits and white poultry are examples of albinism that is fixed by heredity. This condition is often noticed in the flowers of plants.

It is popularly supposed that an albino is weaker in constitution than a normal being, but experiments have failed to show positive proof of this.

ALBU'MEN, or **ALBU'MIN,** a substance which has its purest and best known form in the white of an egg. Scientists make a distinction between the two spellings, *albumen* being actually the white of an egg, and *albumin,* the general term for the chemical compound which has its purest form in the white of an egg. Albumin is a combination of carbon, hydrogen, nitrogen and oxygen, with a little sulphur; it is typical of the class of foods called proteins (which see). It is found in the blood of man and of most animals, in the humors of the eye (see EYE), and in many plants. The albumen, or white, of an average hen's egg is composed of 86.2 per cent water, 12.3 protein and a small proportion of fat and minerals. A dozen eggs yield about three-fourths of a pint of albumen.

Its Uses. When heated, albumin hardens and finally becomes a solid mass. If it is mixed with any liquid and then heated, it either settles to the bottom or forms a scum at the top which can easily be removed. In this process it takes up any substances which may be suspended in the liquid. For this reason many cooks drop an egg into coffee to "settle" it. Albumin is used in sugar refining, and to some extent in other industries.

Albumin hardens not only when it is heated but also when exposed to certain salts, practically all of which are poisonous. Thus, corrosive sublimate, or bichloride of mercury, turns the white of an egg to a solid. If no other remedy is at hand, the white of an egg is the best antidote for many cases of poisoning, as the albumen surrounds the poison with a solid coating which nothing in the digestive system can dissolve.

ALBUQUERQUE, *ahl boo ker' ka,* N. M., the largest city in the state and the county seat of Bernalillo County. It is sixty miles directly southwest of Santa Fe, the state capital, and 530 miles southwest of Denver, on the Rio Grande River, and at the junction of the Atchison, Topeka & Santa Fe and the Santa Fe & New Mexico Central railroads. In 1910 the population was 11,020; in 1914 it was 13,057, and in 1920, 15,157.

Albuquerque is situated at an altitude of 4,950 feet in a broad valley of the Rocky Mountains. Its climate and the beauty of its unique desert and mountain scenery are unsurpassed. Just west of the city are the lands where the Navajo and Hopi Indians still lead

their primitive, picturesque existence. The first village, an old Spanish town founded in 1706 and named in honor of the Duke of Albuquerque, viceroy of New Mexico from 1702 to 1710, is a neat Mexican village near the northeastern boundary of the newer city. The older place is characterized by prim adobe houses and contains a very old Roman Catholic church, San Felipe de Neri, established in 1658.

The newer town of Albuquerque was founded in 1880 and became a city in 1892. It has wide streets and many attractive private residences. Among the notable public buildings are the Carnegie Library, the Federal building and a fine high school. Albuquerque is the seat of the University of New Mexico, which occupies buildings of characteristic Indian architecture on a fine campus south and east of the city. There is also a large government school for Indians and eight denominational and mission schools. In the handsome Santa Fe depot is the Harvey Indian Museum, which has a very complete collection of baskets and blankets. In the southeastern part of the city are a number of sanitariums for the treatment of tuberculosis, where several thousand patients are cared for annually. The Santa Fe Railroad has great repair shops here.

The city has an important trade in live stock, hides and wool, and has extensive lumber and mining interests. One large lumber company, which uses principally the white pine from the Zuni Mountains, operates a saw mill, sash, door and blind factory and a box factory. The mining of lead, zinc, gold and copper ore and coal, truck farming and fruit growing are important industries. The city has a large Indian trading company, foundries and machine shops, tie-preserving plant, woolen mill and flour mills. The manufactured products were worth $3,500,000 in 1920.

ALBUR'NUM, another name for *sapwood,* the soft white substance which is found in trees between the inner bark and the wood. In course of time the alburnum itself hardens into wood, adding rings or layers and increasing the circumference of the tree. The age of trees may be judged by the number of such rings shown when the tree is felled, the time for the formation of the rings varying according to the fast or slow growing nature of the tree. In most cases, however, a ring of hardened alburnum is added every year. In some of California's giant sequoias (which see), over 2,000 rings have been counted, proving their existence at a time prior to the birth of Christ.

ALCESTIS, *al ces' tis,* in Greek mythology, the wife of Admetus, king of Thessaly, and one of the most attractive characters which have been handed down by legend. An oracle had declared that her husband, whom she loved devotedly, was to die unless someone could be found who would meet Death in his place. His aged father and mother were asked to sacrifice themselves for him, but they refused, and Alcestis finally took upon herself the task of saving him. He plead with her not to insist upon her unselfish act, but she was firm, and as Admetus recovered Alcestis died. Hercules, however, having pity upon Admetus, met Death at the tomb, vanquished him and brought Alcestis back to life. The *Alcestis* of Euripides is one of the greatest ancient dramas which have been preserved. Browning's *Balaustion's Adventure* is a free translation of it.

ALCHEMY, *al' ke my,* a so-called science of the ancients, which arose with the beginning of speculation as to the constitution of matter and the visible universe. Its roots go back to the ideas underlying primitive magic and the earliest philosophies. Its search was for the elements and elemental forces from which the earth, and all upon it, was formed; it investigated the processes of change to which matter could be subjected, by fire, by solution, by evaporation, by condensation. Such inquiry led to the discovery of what are now familiar chemical and physical reactions.

Following the clue of human affairs, alchemy assigned value and dignity and virtues and a scale of relation to the several elements; it developed a system of affinities and correspondences between the metals, the stars, the functions of the body and the forces that sustain life. Each part of the body was related to some one element (metal) and some one planet. The ingredients of medicines, the time of taking them, were alchemistically related to the part affected. The application to medicine led to the study of the curative virtues of things.

At the height of its career, alchemy was almost encyclopedic in scope. The Arabs spoke of it as the key that unlocked the mysteries of creation; a more elaborate notion appears in "the philosopher's stone," the discovery of which would enable one to penetrate the reactions of matter, or in such fulfillment of wishes as the "elixir of life," the "fountain of youth" or the panacea for all ills. Alchemy aimed to be science and art in one.

As the practical motive dominated, alchemy became largely a search for the transmutation of the metals, particularly of the baser metals, into gold; for to gold by its attraction and its associated value was assigned the virtue of purity and superiority. In this pursuit there was abundant opportunity for fraud and imposture as well as for misguided experiment and self-delusion; these pursuits gave rise to the accusation of necromancy against many of the alchemists. This was true of Paracelsus (1490-1541), one of the best known of the later practitioners, who made substantial contributions to chemistry and medicine, yet worked dominantly under alchemistic conceptions; he gave special prominence to sulphur and mercury as potent in transformation and medicinal action. Even so late as the end of the eighteenth century, Caglistro—an arch-impostor—played upon the belief in the possibility of making gold, to practise his versatile frauds, and presented his wife, who was twenty, as a woman of sixty who had partaken of the elixir of life.

Alchemy is much more than the search for a process of transmutation to turn baser metals into gold; that became the central aim of its later pursuit. An alchemistic philosophy underlay its practices. The Greeks recognized earth, air, fire and water as the four elements; these interacted and were responsible for the many forms of matter, also for the human body. Hippocrates, the "father of medicine," thought that if the human body were formed of but one element, man would never be ill. He is composed of many elements which conflict; hence the complexity of medical treatment, balancing the dry and light (fire), the dry and heavy (earth), the moist and light (air), and the moist and heavy (water). The four elements and the four humors of the body were closely related. Yet the Greeks were not alchemists, but sought explanations in nature forms. However, they reasoned similarly to the alchemists, who sought it in mystic bonds. The latter dealt in analogies and correspondences. The celestial world gave the clue to the things of earth. The sun represented heat or fire or sulphur, and then gold; the moon corresponded to silver; to complete the system Venus corresponded to copper; Mercury is still the name of a planet and a metal; Mars "became" iron; Jupiter, tin, and Saturn, lead. The alchemistic search was originally like that of the Greeks, for the quintessence (fifth or ultimate essence) of things; they wished to repeat in their alembics the process by which the world was made. Two other ideas accompanied this search; the one the application to the healing of the body, for disease was a disproportion of the elements (hence the preparation of tinctures, extracts, "spirits," elixirs to restore health); the other was the rather mystical notion of separating the spirit from the form, the true essence from the material shell.

More and more the "chemical" side dominated through the notion of transmutation, presumably introduced by Albertus Magnus (1193-1280). This implied a scale of evolution or value through which matter passed on its way to its more perfect form. The perfection of the heavenly bodies, of gold, of true health (immortality), moral perfection—purity of elements and purity of spirit—were assimilated, and affinities in one world found for substances and qualities in another. Such learning was maintained in an atmosphere of secrecy and mystery. Alchemy became more cumbersome, elaborate and fanciful, while the temptation to pretense and fraud increased as the test of the system was concentrated upon the making of gold. At the beginning of the seventeenth century, already markedly on the decline, it gave way to the growth of modern science, which was then well launched upon its career of natural explanation and proof. See SCIENCE, subhead *Pseudo-Sciences*. J. J.

Relating to Various Beliefs. The articles on the following topics, while not bearing on alchemy, are of interest in this connection because they too deal with pseudo-sciences or superstitions:

Astrology	Palmistry
Clairvoyance	Phrenology
Conjuring	Psychical Research
Demonology	Psycho-Analysis
Divination	Physiognomy
Faith-cure	Spiritualism
Hypnotism	Suggestion
Magic	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft
Occult	

Other closely related topics are mentioned in the above article, and will be found in their alphabetical order in these volumes.

ALCIBIADES, *al si bi' a deez,* (about 450-404 B. C.), a famous Athenian of noble birth, handsome in person and of remarkable ability, who for many years bore a leading part in the affairs of Athens. He was the nephew of Pericles (which see), whose talents he shared, but he

lacked the same high moral character. Alcibiades was a lawless, impulsive youth, and not even the influence of his good teacher, Socrates, could turn him from acts of violence and dissipation.

He rose rapidly in political power and set himself up against Nicias as leader of the war party. Alcibiades took an active part in the Peloponnesian War, which began in 431 B. C., and when Nicias was defeated in Thrace in 418-417 B. C., he strongly urged that an attack be made against Sicily. Alcibiades was chosen one of the leaders of this expedition, but just before it sailed he was accused of mutilating the busts of Hermes in one of his midnight revels, and was recalled home for the trial almost as soon as he reached Sicily. Fearing to face his trial, he escaped to Sparta. There he basely betrayed the secrets of his own countrymen, and by advising the Spartans to send help to the people of Syracuse and to fortify Decelea, in Attica, he became the direct cause of the downfall of Athens. The Spartan generals soon turned against him, and, fleeing to Asia Minor, he allied himself with the Persian leader Tissaphernes. Alcibiades, however, was determined to return to Athens, and succeeded in having his banishment cancelled.

Before he returned home he took charge of the Athenian fleet near the Hellespont and won several victories over the Spartans. The Athenians joyfully welcomed him home in 407 B. C., and made him a general with full powers, but he soon lost their favor by reason of a defeat at Notium. In 405 B. C. came the final crushing defeat of Athens at Aegospotami, and Alcibiades took refuge in Asia Minor, hoping to secure the aid of the Persian king against Sparta. There he was killed by hired assassins.

AL'COHOL, a clear, colorless liquid having the appearance of water, with an agreeable fruity smell and a burning taste. It is the alcohol in beer, wine, whisky, brandy and other spirituous and fermented liquors that makes them intoxicating.

Composition and Manufacture. Alcohol is composed of carbon, hydrogen and oxygen in proportions of two atoms of carbon to six of hydrogen to one of oxygen. It can be made by distilling wine, brandy, whisky and other liquors, and for this reason it is sometimes called the spirits of wine, and sometimes simply spirits. It is manufactured from grains (chiefly Indian corn), from potatoes and from molasses. These are fermented as in the manufacture of beer or wine and then distilled. A process of making alcohol from waste wood has been discovered, but up to the present has been little used.

Properties. Alcohol is lighter than water, and in the open air at sea level it boils at a temperature of 173° F., while water must reach 212° before it boils. It will withstand intense cold without freezing and is used in thermometers designed to measure temperatures lower than —40°, at which point mercury freezes. It burns with a light blue flame and intense heat, and is used in alcohol lamps in laboratories, and with chafing dishes and other devices in the home.

Uses. Alcohol dissolves essential oils, gums, resins and many other substances that cannot be dissolved in water; consequently it is extensively used in the manufacture of varnishes, perfumes and medicines. Ether and chloroform are made from it and it is also employed for many other purposes in the arts. Some vinegar is made from alcohol, and in museums specimens are preserved by placing them in sealed vessels containing alcohol. The benefits derived from alcohol are many. Without it the world would be deprived of the valuable anesthetics, ether and chloroform, as well as some of the most effective medicines which are prepared as tinctures. Spirits of camphor consists of camphor dissolved in alcohol.

Denatured Alcohol. Denatured alcohol is alcohol to which something has been added to give it a disagreeable taste. The most common kind of denatured alcohol is methylated spirits. This is a mixture of 100 parts of alcohol, ten parts wood alcohol and a small quantity of benzine or some other substance which renders the mixture unfit for drinking. In 1907 the United States government removed the revenue tax on denatured alcohol, and it is now used extensively for manufacturing purposes, except in those cases where pure alcohol is necessary. In Canada the manufacture of denatured alcohol (methylated spirits) is a government monopoly. J.F.S.

Alcohol and the Human System. See the article below, ALCOHOLIC DRINKS, which reflects the deepest scientific investigation.

Related Topics. For fuller inquiry into the story of alcohol and the various movements directed against it, see the following articles in these volumes:

Alcoholic Drinks
Anti-Saloon League
Local Option
Prohibition
Temperance

ALCOHOL'IC DRINKS. Of all substances in common use by mankind alcohol has proved the most deceptive. Taken ordinarily to "stimulate" and to "strengthen," its main effect is always to slow and depress activity and to weaken. The brief, temporary, deceptive effect of small and moderate doses, with many people, is to cheer and exhilarate, but this condition soon gives way to more prolonged phases of dullness and misery, ill temper and irritability.

The Truth Setting Men Free. Science is slowly analyzing and explaining all these contradictory effects, and as the truth is growing clearer, alcohol is being more and more banished from use. Its last stronghold, in medical practice, is fast breaking up. Staff physicians of leading hospitals are abandoning alcohol entirely and are using in its stead milk and other nutrients and other drugs of known physiological effect. The reputable physicians of cities are publicly pledging themselves not to prescribe it in any form, and drug stores are meeting this action of the physicians by refusing to keep in stock any kind of alcohol suitable to drink. The deceptive effect of alcohol has long been the basis for all liquid patent medicines, but here the deception is so palpable and disastrous that those who can be deceived in this way must ere long die off, and with them patent-medicine alcoholism must disappear.

The whole trend for the past century, from the almost universal use of alcoholic beverages as necessaries of life to the now common view that everybody would be better off without any of them, must be regarded as an example of the truth gradually setting us free. About the year 1900 the Committee of Fifty enlisted the help of many of the university laboratories of the world in carrying out most searching investigations on every phase of the alcohol problem. Before that time university workers had been active, and now the Carnegie Institution (which see) has projected the most complete scheme for a re-investigation of the whole subject that probably has ever been devised for the study of a scientific problem. Young people especially should know that these expensive investigations are being made for them, and they should take pains to keep abreast of discoveries in this field. The truth in such matters is very precious. Truth is defined as "that which the mind is compelled to approve as a basis of conduct." Or, as Sir John Herschel stated it, "Truth is that which has the capability of enduring the test of universal experience, and of coming unchanged out of every possible form of fair discussion."

The fact that men have not yet come to a universal basis for conduct may mean that we have not discovered truth enough about alcohol, or that some have not taken the pains to learn the truth, or that many are still entangled in customs, habits, appetites and prejudices, and are as men convinced against their wills. But science must yield all benefits of doubt, and she is never lazy. She will continue to gather the evidence, and we are likely to see more real progress won in the reasonable solution of the alcohol problem before 1930 than has been made in the past century.

Some Incorrect Beliefs. University researches in recent years have thrown a flood of light upon the fundamental reasons in human nature that underlie the use of alcoholic drinks. They have all conspired to prove that alcohol is not a "stimulant," but a sedative, a quieter of overtaxed nerves, a depressant of normal activity, a retarder of growth and a deadener of mental and emotional processes. Hence alcohol is taken to allay pain and misery, relieve the sense of fatigue, weakness and inefficiency and to drown grief and sorrow. When we study the problem from this point of view, we begin to see what is before us. We can do away with the use of alcohol when we mitigate the wrongs and miseries of our social order, and hardly before. No one who is efficient, successful and feels keenly that life is worth living to the full could knowingly wish to chloroform himself. Van Dyke has summed up this side of the case as follows:

> Drunkenness ruins more homes and wrecks more lives than war. How shall we oppose it? I do not say that we shall not pass resolutions and make laws against it. But I do say that we can never really conquer the evil in this way. The stronghold of intemperance lies in the vacancy and despair of men's minds. The way to attack it is to make the sober life beautiful and happy and full of interest. Teach your boys how to work, how to read, how to play, you fathers, before you send them to college, if you want to guard them against the temptations of strong drink and the many shames and sorrows that go with it. Make the life of your community cheerful and pleasant and interesting, you reformers. Provide them with recreation that will not harm them, if you want to take away the power of the gilded saloon and the grimy boozing-den. Parks and playgrounds, libraries and music rooms, clean homes and cheerful churches are the efficient foes of intemperance.

It is a long step toward a solution of the problem thus to gain an insight into its essential

character. As long as there are "minds" that have nothing higher and better in them than "vacancy and despair" the craving for drink will possess them. Recent studies, notably those of Goddard, have thrown doubt upon the commonly-accepted theory that alcoholism is a prominent factor in causation of mental defects, but these same researches emphasize the fact that feeble-mindedness is a marked factor in causation of alcoholism. For the normal-minded it would seem as if the resources of modern life, in art, science, literature, education, and even sport and athletics, ought to be able to supply something better than "vacancy and despair."

Effects upon Labor. Laboratory experiments have analyzed all manner of condition in connection with work, both bodily and mental, and have drawn aside the masks of deception under which alcohol has been used. In setting type; sending and receiving telegrams; adding figures; memorizing words; shooting or throwing at marks; performing feats of skill, strength or endurance, or in doing fine mechanical work, the man under the influence of even small doses of alcohol is slower, fatigues more rapidly and does work poorer in quality than when no alcohol is taken. The man himself feels that he is working more rapidly and easily and doing better work than usual, but this is because his judgment is dulled and his sense of effort and feelings of fatigue are paralyzed. The scientific tests and measurements leave no room for doubt as to his self-deception.

Harrington Emerson has well said that "one single idea may have greater value than all the labor of all the men, animals and engines for a century." So the best part of life consists in the flow, or "association," of thoughts or ideas. The influence of alcohol upon this process has been studied carefully and it has been found that even slight indulgence tends to lessen the deeper, more important or rational associations, and at the same time greatly increases the superficial, trifling or nonsense associations. Men are thus again deceived, and feel that they are thinking brilliantly and rapidly, but when they view the results soberly, they find that their thinking was illogical and trifling. The great Von Helmholz left testimony that ought to be studied by every young person. The world owes to Von Helmholz many of its most brilliant discoveries and greatest ideas. He spent his life hunting for hard problems and for ways of solving them, and such hunting is much more arduous than any other; big ideas are the most elusive of any kind of "big game." He says in describing his methods of work that even the slightest indulgence in alcohol completely banished from his mind all traces of the ideas he was seeking.

Cause of Heat Prostrations. The man who drinks, even in moderation, destroys safeguards to health in heated summer weather. The records of one hospital proved that ninety-eight per cent of heat prostrations treated in a week in its city were due to habitual indulgence in alcoholic stimulants, and of those forty-four per cent died. Following is an extract from a report of two physicians of that hospital after a remarkable study of the effects of drink on the patients:

> Beer and booze have two effects: They increase the bodily supply of heat and they lower the powers of resistance. The heat-regulating center in the brain becomes deranged and the almost inevitable result is prostration.
>
> The normal temperature of the body is 98.6. In cases of heat prostration it rises to 110, 112, and even 114, considerably beyond the register of our thermometers. We have had patients whose skins felt like hot roast.
>
> It was hardly necessary to question many of them because the external evidence of the use of alcohol was so plain. A case of heat prostration without an alcoholic breath seemed a rarity. In fatal cases the use of a stomach pump commonly revealed the fact that the victim had been drinking.
>
> And if it weren't for alcohol they probably wouldn't have been here. If alcohol was taken out of the world, I believe the number of cases of all kinds at this hospital would be reduced by half.

Crowding Out the Drinkers. On account of their now well-known impaired reliability and lessened efficiency, habitual users of alcohol are being rapidly crowded out of many of the higher fields of employment. In fact, the keen competition of modern business and increase of powerful, high-speed machinery is rapidly "scrapping" everything alcoholic and throwing everyone addicted to its use upon the rubbish heap of humanity. It would seem that our huge armies of the unemployed (and unemployable) indicate this process going forward with volcanic rapidity. This new "industrial prohibition" may speedily bring about results that social reformers, with the best of arguments, have striven for in vain. Alcohol is definitely a habit-forming drug, which requires progressively larger and larger doses to produce the desired effects. The old deception

which prompted men to boast that they had "will power" enough to avoid excess ought no longer to mislead anyone, and no young person of normal intelligence and ambition has any right to risk his chances for social and industrial promotion.

Its Effect upon Posterity. Finally, what effect has alcohol on the offspring and on the race? From comparatively trifling questions of personal liberty or indulgence we are rapidly coming to see that the answer to this fundamental question must determine the use of alcoholic drinks by man. The human problem being too complex for sure interpretation, exhaustive laboratory experiments have been made upon animals. These have confirmed observations upon men and now present most convincing evidence that alcohol weakens the germinal cells and tends to cause stillbirth and early mortality, deformation of the brain and sense organs, and weakening and degeneration of offspring in both animals and man.

Experiments upon Animals. Carefully-balanced experiments were made with dogs, the females being sisters from the same litter and the males brothers from an unrelated strain. To one pair chemically pure alcohol was given daily, diluted and with the food, in amounts too small to cause perceptible intoxication. The growth of the dogs was not interfered with, and their general health remained normal, except that an epidemic of distemper affected all the alcoholic dogs in the kennel much more severely than it did the normal animals. This also confirms considerable evidence gathered from observations upon man that infections are more likely to be serious or fatal in case of alcoholics.

The sedative effect of alcohol, mentioned above, was clearly demonstrated in the alcoholic dogs. They showed only about half the play and spontaneous activity of their normal brother and sister. In tests of strength and endurance, too, the normal dogs showed more than thrice the ability and less than fifteen per cent of the fatigue of the alcoholics. There are many similar experiments on men, and they all point to the same conclusion, viz., that alcohol must be excluded from the diet of men likely to be called on for feats of skill, strength and endurance. The British official report on the Boer War—in which it took 300,000 veteran English soldiers to overpower 25,000 abstaining Boer ranchmen—leaves no doubt as to the bad influence of alcohol on the stamina, vigor and general physical and mental efficiency of men.

Returning to the experiments, the alcoholic dogs developed marked timidity, a trembling, cringing nervousness, totally absent from the behavior of their normal fellows. This, again, substantiates the human experiment, in which delirium tremens is the most terrible fear; alcoholic insanities commonly take the form of phobias, or irrational fears.

This series of experiments extended over more than five years; its most important results are seen in the reproductive history of the two pairs of dogs. This is given statistically in the table below:

	ALCOHOLIC PAIR					NORMAL PAIR								
	Litters				*Total*	*Litters*								*Total*
Number of whelps	*7*	*7*	*6*	*3*	*23*	*5*	*3*	*8*	*8*	*5*	*6*	*3*	*7*	*45*
Deformed	2	3	3	0	8	1	0	0	2	0	0	0	1	4
Born dead	2	2	2	2	8	0	0	0	0	0	0	0	0	0
Lived	4	0	0	0	4	4	3	8	6	5	6	3	6	41

Demme, in Switzerland, compared the children in ten alcoholic and ten normal families over a long period of years, with the following results:

TEN ALCOHOLIC FAMILIES		TEN NORMAL FAMILIES	
Number of children	57	61	
Deformed	10	2	
Idiotic	6	0	
Epileptic, choreic	6	0	(2 backward)
Did not live	25	3	
Lived (1 epileptic)	10	54	

The recent findings of Pearson and Goddard, the latter in tracing especially the causes of idiocy and feeble-mindedness, would seem to suggest that Demme's alcoholic families contained some defective stock, the alcoholism being a result rather than the cause of at least some of the defective offspring. C.F.H.

ALCOTT, *awl' kut,* Louisa May (1832-1888), an American storywriter, the author of probably the best-loved book in literature for young girls, entitled *Little Women.* She was born in Germantown, Pa., the daughter of Amos Bronson Alcott. Most of her life was passed in Concord, Mass., whither the family removed in 1840, and *Little Women* is largely a record of the experiences of herself and her three sisters in the Orchard House, their Concord home. This house has been bought by the Alcott Memorial Association as a permanent memorial of the author.

LOUISA MAY ALCOTT
She possessed the secret of laughter as well as of tears. Her charm for girlhood is less in the story that she wrote than in the tenderness with which she wrote it.

Miss Alcott, like "Jo" in *Little Women,* began to write short stories for publication at the age of sixteen. She taught school for ten years, and had her first book, *Flower Fables,* published in 1855. In 1863 she wrote *Hospital Sketches,* an account of her life as a nurse in a Washington military hospital, but she found her real field in 1868, when *Little Women* appeared. This was the first of a series of books for boys and girls, all of which have been enthusiastically received by young American readers. *Little Men* and *Jo's Boys* continue the fortunes of the family described in *Little Women.* In *Old Fashioned Girl* and *Eight Cousins* the author makes known some of her views on the bringing up of girls. All of these children's stories show the influence of her father, who was her chief teacher. They are written in a humorous, entertaining style, and show how interesting the commonplace scenes of every-day life can be made. Others of the series are *Rose in Bloom, Under the Lilacs* and *Jack and Jill.*

THE ALCOTT HOME, "ORCHARD HOUSE"

Amos Bronson Alcott, her father, was also a writer of note and a leader in the Transcendental school of philosophy, and in the community known as Brook Farm. His best-known work is possibly *Concord Days,* whose theme centers about Transcendentalism. See Brook Farm; Transcendentalism.

ALDEN, *awl' den,* Isabella McDonald 1841-), an American author whose books for girls, written under the pen name of Pansy, have been among the most popular of American productions. She was born in Rochester, N. Y., was editor of several religious papers, including the *Christian Endeavor World,* and wrote some serious books for adults, among which is a life of Christ. Her *Pansy* books have an exceedingly high moral tone.

ALDEN, *awl' den,* John (1599-1687). In the records of the old colony of Plymouth, planted on the rock-bound coast of New England in the year 1620, there is mention of one John Alden who was hired "for a cooper at Southampton, where the ship (*Mayflower*) was victualled." The narrative goes on to say—"Being a hopeful young man, he was much desired, but left to his own liking to go or stay when he came here, but he stayed and married here." One would scarce know from these brief lines that a romantic interest attaches to the name of John Alden, but tradition has preserved his story for us, and it has been immortalized by Longfellow, though its hero rests in an unmarked and unknown grave.

In the division of the land into homesteads, John Alden was assigned to the house of the famous Captain Miles Standish (which see), and the two became close friends. The Captain's wife died during the first winter, and the lonely husband, seeking someone to fill her place, turned his thoughts to Priscilla Mullins, "loveliest maiden of Plymouth." Though not afraid of shot from the mouth of a cannon,

the sturdy Captain was not brave enough to face a possible "No" from the mouth of a woman, and so he commissioned his friend Alden to plead his cause. How John faithfully carried out the Captain's request, though he had dreamed of winning Priscilla for himself, and how the maiden interrupted his suit with the unexpected question—"Why don't you speak for yourself, John?"—may be read in Longfellow's well-loved epic of Plymouth colony, *The Courtship of Miles Standish,* an account of which appears in its place in these volumes, with an illustration.

Of the personal appearance, character and abilities of the first American Alden, colonial records have considerable to say. He was tall and handsome, and though only twenty-one when he embarked on that perilous journey to the New World, he eventually became one of the leading men in the colony. Of the company that signed the famous Compact in the cabin of the *Mayflower,* he was the youngest, and he outlived all of the other signers. Thrift and enterprise marked his entire career. A few years after his marriage to Priscilla, which probably took place early in 1622, he purchased a farmstead in Duxbury, consisting of about 169 acres of well-watered fertile land. This became his permanent home, and the site of the first house in which he lived is marked by a marble slab. Eleven sons and daughters were born to John and Priscilla, and in the list of their descendants we find the names of Henry W. Longfellow, William Cullen Bryant, John Adams and Charles Francis Adams.

The public career of John Alden was honorable. He was one of the financial backers of the colony until its debt was wiped out in 1646; he acted as its business agent, and was several times surveyor of highways. In 1632 he was appointed a member of the board of assistants to the governor, holding that office again in 1634-1639, and from 1650 until his death in 1687. Nearly all of the original farmstead at Duxbury has passed from the Aldens, but a house built by the founder of the family in 1653 is still preserved, and is owned by one of his descendants. B.M.W.

ALDER, *awl' dur.* These plants, of which some are shrubs and some large trees, are related to the birches, and like them are useful to man in many ways. The common alder, which thrives in wet places in the temperate and colder regions of the United States, Canada and Europe, is often of great importance while growing, for its spreading roots hold in place soil along the river banks which might otherwise be washed away by floods. The wood, light and soft and of a reddish color, is used for a variety of purposes, and is especially good for making such things as are kept constantly in water, since it does not rot. The roots and knots furnish a beautifully-grained wood, well suited for cabinet work, while the charcoal made from the burned wood is used in the making of gunpowder. The bark is used for tanning and leather-dressing, and it also furnishes a good dye of various shades of red and yellow. This common alder, though somewhat stiff, is a handsome tree, with large, roundish, deeply-notched leaves and long reddish-yellow catkins.

ALDERMAN, *awl' dur man,* a member of a city council, or board of aldermen, and consequently a legislator for his city. In most cities aldermen are elected by wards, each ward being entitled to one or two members, according to the provisions of the city charter, or plan of government. Aldermen are usually chosen for two years, and in cities having two aldermen for each ward it is customary to elect one every year. The city council has power to make such rules and regulations for the government of the city as the laws of the state permit. In discharging his duties as legislator, each alderman is expected to look after the special interests of his own ward. He is nearly always a member of one or more standing committees of the board of aldermen, and thus his influence reaches over the entire city. Only in large cities are aldermen paid salaries; in smaller towns they usually serve without compensation.

ALDERMAN, Edwin Anderson (1861-), an American educator, who has been president of several important institutions. He was born at Wilmington, N. C., was graduated at the state university and entered the teaching profession, becoming successively superintendent of city schools at Goldsboro, assistant state superintendent of instruction in North Carolina and professor in the state normal college. From 1892 to 1896 he was professor of pedagogy in the University of North Carolina, and from the latter year to 1900 was president of that institution. After serving for four years as president of Tulane University he was, in 1904, elected president of the University of Virginia.

ALDERNEY, *awl' dur ny,* one of the Channel Islands belonging to Great Britain, sixty miles from the English coast and separated

from France by the Race of Alderney, a channel seven miles wide. It is chiefly noted as the original home of the distinctive breed of cattle named after the island (see CATTLE). It has an area of only three square miles, one-third of which is occupied by grass lands. Agriculture and cattle raising are the only industries. The chief town is Saint Anne, in the center of the island. The climate is mild and healthy. Many tourists visit the island in summer, for whom a line of steamers maintain a daily service between Jersey, Guernsey and Alderney and the mainland. Population in 1911, 2,561. See CHANNEL ISLANDS.

ALDERSHOT, *awl' dur shot,* a military station in northeast Hampshire, England, thirty-five miles southwest of London. The great military camp there was originated in 1854, when the government purchased a tract of moorland known as Aldershot Heath, within the limits of Surrey, Hampshire and Berkshire. A permanent garrison is maintained and Aldershot is the principal base for training and summer manœuvres of troops. At the beginginning of the War of the Nations in 1914 the accommodations of the camp were greatly increased. Population, in peace time, about 35,000, including military forces.

ALDRICH, NELSON WILMARTH (1841-1915), an American political leader, for thirty years Rhode Island's representative in the United States Senate, and for the last decade or more of that time its acknowledged leader. His knowledge of tariff and financial problems was probably not exceeded by that of any other man in Congress, and he was a master of parliamentary practice. He was wealthy and intimately connected with large financial interests, a combination which caused popular distruct of his views on banking; but to him belongs a large share of the credit for creating a demand for banking reform and for providing a solution, the Federal Reserve system (see BANKS AND BANKING).

ALDRICH, THOMAS BAILEY (1836-1907), an American editor, story-writer and poet, for years a favorite of youthful readers as the author of a charming juvenile narrative of his own boyhood, called *The Story of a Bad Boy.* He was born in Portsmouth, N. H., lived in New England and Louisiana, and began a literary career in New York at the age of twenty-one. He wrote for several newspapers and periodicals, and in 1881, when William Dean Howells resigned from the editorship of the *Atlantic Monthly,* he succeeded to that position. After 1890 he devoted his time to writing and travel.

The house in Portsmouth where Aldrich lived as a boy, the scene of his *Story of a Bad Boy,* is now a museum containing interesting relics of the author. Aldrich's poetry is light, graceful and musical, and shows careful workmanship, though it is not remarkable for depth or power. In artistic merit it has been compared to the poetry of Tennyson. His prose style is likewise delicate and polished. Important among his poetic writings are *The Bells, The Ballad of Babie Bell, Cloth of Gold* and *Unguarded Gates.* His prose works include *Marjorie Daw, Prudence Palfrey, The Stillwater Tragedy* and *The Queen of Sheba.* He also published a tragedy in blank verse entitled *Judith of Bethulia.*

ALE, a liquor much like beer. Indeed, any light-colored beer is commonly called ale, but there is some difference in the process of manufacture. In making ale, the fermentation is stopped before all the sugar is changed to other compounds, and is allowed to continue longer in the barrels. This makes ale stronger than beer. The pale color is due to the fact that the malt which is used is dried at a low heat, and consequently remains light-colored. As ale contains from two to three times as much alcohol as does lager beer, it is correspondingly more harmful to the system if taken in large quantities. Water is often called *Adam's ale.*

ALENCON, *a len' sone,* or in French *a lahN' soN,* is one of the most beautiful towns of France, capital of the Department of Orne, and long famed for the manufacture of point lace, called point d'Alencon (see LACE). It is situated on the right bank of the Sarthe, 105 miles west of Paris. Fine rock-crystal, yielding so-called Alencon diamonds, is found in the neighboring granite quarries. Population in 1911, 17,378.

ALEP'PO, the capital of Aleppo province, a division of Turkey in Asia, is an important and historic trade center, eighty miles east of the Mediterranean Sea, in Northern Syria. The city is of ancient origin. It was repeatedly taken from the Turks, once by the Crusaders in 1170, but was finally recaptured in 1516 by the Turkish Sultan Selim. It has suffered severely from earthquake and plague, but is now a picturesque, prosperous and fairly healthful city. Once on the principal caravan route between Asia and Europe, Aleppo still has an important trade in manufactured articles, which include costly silks brocaded with gold and silver

hreads. The population is about 200,000, three-fourths of whom are Moslems.

ALEUTIAN *a lu′ shan,* **ISLANDS,** a group of small islands extending southwest for over 800 miles in a graceful curve from the Alaska Peninsula, separating Bering Sea from the Pacific Ocean. There are about 150 islands in the group, which was formerly known as the Catherine Archipelago, in honor of the Russian

ALEUTIAN ISLANDS

From Alaska Peninsula to the westernmost island is nearly as great a distance as from New York to Chicago.

empress of that name. The present name refers to the Aleuts, the natives of the region. The area is 6,391 square miles. Most of the islands are small, all have rugged or mountainous surfaces, nearly all show the marks of volcanic origin, and on a number of them are extinct volcanoes. Hot springs are common, but some of the larger islands contain cool springs and rapid streams. Those containing soil are covered with growths of shrubbery, grass, moss and lichens, but there are no large trees.

Until recently it was supposed that these islands were unsuited to any form of agriculture, but the largest have been found well adapted to the raising of live stock, and since 1900 several ranches owned by Americans have been established upon them. The native Aleuts are a branch of the Eskimo stock. Population in 1920, about 3,000. See Alaska; Eskimo; Aleuts.

ALEUTS, *al′ i yutes,* a branch of the Eskimo family, native in the Aleutian Islands, the latter having been named for them. The origin of the word is unknown, unless the conjecture is correct that it is derived from the Indian *aliat,* which means *island.* The Aleuts are said to be more intelligent than their relatives, the Eskimos, and a little more sanitary in their customs, but lack some of the initiative and independence that the Eskimo possess.

They occupy most of the Aleutian Islands, and are scattered along the adjoining Alaska Peninsula and the northwest coast of the continent. When the Russians first occupied Alaska the Aleuts numbered 25,000; now there are only about 2,000. At various times smallpox has killed hundreds in a single visitation. See Eskimo.

ALEWIFE, one of the most important North American food fishes, found in vast numbers on the eastern coast. It closely resembles the herring and the shad, but is slightly inferior in quality and flavor. The name may be derived from the Indian *aloofe,* or from the supposed resemblance of the fish in general contour to a corpulent woman. It attains an average length of eight to ten inches, with a weight of from one to two pounds. Vast shoals enter Chesapeake Bay and many eastern rivers to spawn, each female depositing from 60,000 to 100,000 eggs.

ALEXAN′DER, the name of eight Popes, whose names and dates may be found in the article Pope. The most famous of the eight is *Alexander VI* (Rodrigo Borgia, 1431-1503), who was born at Valencia, in Spain. He was in his early youth a handsome and gallant courtier, but he soon developed remarkable executive ability and at the age of twenty-five was appointed a cardinal by his uncle, Pope Calixtus III. At the death of Innocent VIII in 1492 he became Pope. He set himself the task of reducing the power of the Italian princes and increasing the papal revenues. Endowed with sagacity and fearlessness, he accomplished all he undertook. Among the events of his reign are the introduction of the index of prohibited books (see Index Expurgatorius), the division of the New World between Portugal and Spain, and the burning of Savonarola. Two of Alexander's children, Caesar and Lucretia Borgia, were very prominent in the life of their day (see Borgia).

ALEXANDER, the name of three important emperors of Russia.

Alexander I (1777-1825) came to the throne in 1801 on the assassination of his father, Paul I. He joined the union of the powers against Napoleon in 1805, but after severe defeats signed the Treaty of Tilsit (1807), in which he and Napoleon agreed to divide the world between them. Alexander deserted Napoleon in 1812, which led to the latter's invasion of Russia and the famous retreat from Moscow.

After the Battle of Waterloo the Russian emperor joined with the emperor of Austria and the king of Prussia in the agreement known as the Holy Alliance (see HOLY ALLIANCE). Alexander's policy in home affairs was at first one of progress and reform. He tried to improve the condition of the serfs, created eight new departments in the government, founded a national bank, and encouraged education, art and literature. Later in his reign, however, he followed the policy of the Austrian statesman Metternich, the foe of popular liberty. See METTERNICH.

Alexander II (1818-1881) succeeded his father, Nicholas I, in 1855, before the end of the Crimean War. After signing the peace treaty at the end of that conflict, he set himself the task of bringing about national reforms. His greatest act was the setting free, under certain conditions, of over 22,000,000 Russian serfs (1861). He also founded a regular system of courts and public and scientific schools. During his reign the Russo-Turkish War of 1877-1878 took place (see BERLIN, CONGRESS OF). After 1863 Alexander became more and more despotic, which led to his assassination in 1881 by a Nihilist (see NIHILISTS).

Alexander III (1845-1894) succeeded his father Alexander II in 1881, but was not crowned until 1883. Fear of attacks from Nihilists kept him a prisoner in his palace during his reign, and prevented him from adopting a liberal course. The people of the Baltic province and of Finland were given less liberty, the Jews were oppressed, and the Nihilists sternly held in check. In the affairs of Europe Alexander was an advocate of peace and without war succeeded in extending the Russian frontier in Asia. Though his reign was not eventful, his country made considerable progress through his encouragement of railroads and manufacturing. He was succeeded in 1894 by his eldest son, Nicholas II, the last czar of the Russians.

ALEXANDER, JOHN WHITE (1856-1915), one of the greatest of American artists, who with Whistler, Abbey and Sargent made up the so-called "big four" of their day. He was born in Allegheny City, Pa., became a telegraph boy, but showed such decided artistic talent that an employer enabled him to gain the art education he so much desired. After studying in Bavaria, in Italy, in Holland and in Paris he returned to the United States, where his fame soon became great. Many distinguished men, including Oliver Wendell Holmes, John Burroughs, Robert Louis Stevenson, Roden and Walt Whitman, sat to him for their portraits, and his portrait of the last named ranks as one of his greatest works. Particularly noteworthy are his mural paintings on *The Evolution of the Book* in the Congressional Library and his *Apotheosis of Pittsburgh* series in the Carnegie Institute of that city.

ALEXANDER SEVE'RUS (205-235), a Roman emperor who, in a corrupt age, sought to improve the moral condition of his people. He was made emperor in 222 by the praetorian guards, and governed ably both in peace and war. When on an expedition into Gaul to repress an invasion of the Germans, he was murdered with his mother in an uprising of his troops, headed by the brutal Maximin, who succeeded him as emperor.

ALEXANDER THE GREAT (356-323 B.C.), the most impressive figure of his age, and one of the most remarkable characters in all history. Among the mighty warriors of the past, he ranks with those whose genius has been effective in altering the current of the world's history—Julius Caesar, Charlemagne, Napoleon. Alexander was the son of Philip of Macedon (see Philip II), himself an able general and organizer. It is said that the young prince, even more ambitious and energetic than the king, wept bitterly to hear of his father's conquests, for he feared there would be no worlds for him to conquer. At the age of thirteen the youth became the pupil of Aristotle, who inspired the talented boy with an eager love for literature and philosophy, wielding an influence that was permanent and far-reaching.

THE BUST CALLED "ALEXANDER DEIFIED"
From a bust in the Royal Museum, Berlin.

When Alexander came to the throne of Macedon, at the age of twenty, he was con-

fronted by conditions that would have disheartened a less resolute prince. The Greek states, restless under Macedonian authority, were but waiting for an opportunity to revolt, and when the new king was away campaigning against some barbarian tribes on the northern border of Macedon, the Thebans rose in rebellion and persuaded the Athenians to become their allies. To this appeal the Athenians were not slow in responding, for the report had been circulated that Alexander was dead. But before the Greek cities had an opportunity to work out a plan of action, the king and his army appeared before Thebes. The city was stormed and every building within it destroyed, save only the house of Pindar, while the inhabitants, 30,000 in number, were sold into slavery. This summary action quelled the spirit of rebellion, and all Greece submitted to the new ruler.

ALEXANDER'S EMPIRE
His possessions at the height of his career.

Conquest of the World. The next great project of the ambitious young monarch was the conquest of the Persian Empire. In the spring of 334 B.C., he crossed the Hellespont (see DARDANELLES) with an army of 35,000, and on the River Granicus won a victory over the Persians that opened the gate to all Asia Minor. The following year, 333 B.C., he was opposed on the plain of Issus, on the northeastern coast of the Mediterranean Sea, by a huge army of 600,000 commanded by Darius III, and again he was victorious. He then turned southward to Phoenicia, and after a memorable siege of seven months he captured the island-city of Tyre—perhaps his greatest military achievement. To accomplish this he was forced to build a causeway through the sea to the city, and the ancient structure may still be seen. A terrible punishment was meted out to the brave Tyrians, for 8,000 of the people were slain, and the survivors, to the number of 30,000, were sold into slavery. All of the cities of Palestine and Philistia then submitted to the conqueror, except the city of Gaza. After resisting a siege for three months, its people, too, were obliged to yield, and they suffered the same cruel fate as the Tyrians.

Alexander now was free to turn his attention to Egypt. In that country, however, he met with no resistance, for the Egyptians welcomed him as one who would deliver them from Persian tryanny. At one of the mouths of the Nile he founded a city which he named Alexandria, and which was destined to become a world center of commerce and of learning (see ALEXANDRIA). While in Egypt he visited the famous temple and oracle of Jupiter Ammon, in the Libyan desert. There he heard from the oracle that he was the son of Jupiter and was destined to be the conqueror of the world.

In 331 B.C. Alexander began his march toward the heart of the Persian Empire.

Darius, meantime, had collected another vast army, numbering, it is said, over a million men. On the plains of Arbela, near the city of Nineveh, the two armies met in battle. The Macedonians, though consisting of not more than 47,000 infantry and cavalry, were highly disciplined, and they drove the Persian hordes from the field with terrible slaughter. Arbela, one of the fifteen decisive battles of history, marked the end of the struggle between Oriental and Western civilizations. The triumphant Macedonian ruler next led his army to the city of Babylon, which submitted to him without striking a blow. Susa and Persepolis, each of which yielded him vast treasures of gold and silver, were his next prizes of war; the inhabitants of the latter city were either massacred or sold into slavery.

Alexander had come by this time to regard himself as the successor of Darius, who had been slain by one of his own generals after his flight from the field of Arbela. In carrying out his plans as a world-conqueror he led his army to remote regions, subduing tribes that dwelt along the southern shore of the Caspian Sea, and the peoples of Bactria and Sogdiana, beyond the towering Hindu-Kush range. Many cities, some bearing his own name, were founded along his victorious march. In Sogdiana he killed his dearest friend Clitus, during a drunken quarrel—an act that overwhelmed him with remorse and showed him that though he was a conqueror of cities, he could not rule his own spirit.

The next country to acknowledge his prowess was India. Its fertile and populous plains were reached in 327 B. C. Nearly all of its native rulers submitted to him, and only the complaints of his toil-worn soldiers kept him from extending his conquests as far east as the River Ganges. It was therefore an opportune time for him to carry out a project that savored of peace rather than of war—to rediscover a lost water route between the Indus and the Euphrates rivers. Sailing down the Indus, he founded another Alexandria at the head of the delta, and then proceeded to the mouth of the river, which he discovered had its outlet in a great sea, the Indian Ocean. With the greater part of his army he now followed the coast westward, while his trusted admiral, Nearchus, was commissioned to explore the sea with a fleet. Two months later the two joined each other in Carmania, in Southeastern Persia, and Alexander learned with joy that the lost route had been successfully navigated.

Alexander was now the sole ruler of a vast realm stretching from the Ionian Sea to the Indus River, and his ambitious spirit projected brilliant schemes for the consolidation of what was practically the civilized world. He contemplated nothing less than the union of all the nations into one great family, with one language and a common civilization. Not only did he himself marry an Asiatic wife—the daughter of Darius—but he persuaded thousands of his soldiers to follow his example. He hoped even to make the continents of Europe and Asia correspond in their natural wealth, by transplanting the vegetation of one to the other. Babylon was chosen as the capital city of the great Empire. Unfortunately for the outcome of these plans, Alexander, whom Themistocles correctly judged to be "greater in genius than in character," was given to debauchery and shameful excesses, and in 323 B. C., when he was but thirty-three years of age, he died of a fever brought on by self-indulgence. His body was conveyed to the Egyptian city of Alexandria, and over his coffin was erected a magnificent mausoleum. After his death his great Empire was divided among several rulers.

His Character. Because of his military genius, his interest in art, literature and science, his ability as an organizer, and his far-reaching plans for the blending of the nations, Alexander deserves truly to bear his title "the Great." The extraordinary talents of the man overshadow the defects that marred his character—his lack of self-control, his occasional outbursts of vindictive cruelty, his inordinate vanity. Yet he could be most kind and generous, and there was not one hardship suffered by his soldiers which he himself did not endure. Whatever be the final estimate of his character, the achievements of Alexander the Great will stand out in bold outline so long as history is read. To him the world owes the preservation of Greek culture at a time when there was danger that Oriental ideals would dominate both the East and the West. By introducing the spirit of Greek civilization to the peoples of Egypt and Western Asia, he laid the foundations for the spread of Christian teachings, three centuries later. W. E. L.

Consult Mahaffy's *The Story of Alexander's Empire;* Grote's *History of Greece.*

ALEXAN'DRA (1844-), daughter of Christian IX of Denmark and wife of Edward VII of England. Since the death of the latter, in 1910, she has been honored as the queen-

mother of England. Alexandra was born at Copenhagen. When nineteen years old she was married to the Prince of Wales, and her first public act, as the Princess of Wales, was the opening of the Cambridge School of Art (1865). A year later she was present at the opening of Parliament. The death of the Prince Consort in 1861 was followed by the practical retirement of Queen Victoria from active social duties, and this talented daughter of King Christian, after her marriage to the Prince of Wales, took the queen's place in society, carrying out her task with dignity and grace. Alexandra was crowned with Edward VII on August 9, 1902, and reigned with him as queen until his death. She is an accomplished musician and is everywhere respected and loved by the English people. In 1913 she celebrated her fiftieth wedding anniversary.

ALEXANDRIA, *al ex an' dree ah,* an ancient city and seaport in Egypt, long the center of Greek learning and civilization. It was founded by Alexander the Great in 332 B. C., and lay at the northwest angle of the Nile

MAP OF ANCIENT ALEXANDRIA

(*a*) Canal
(*b*) City walls
(*c*) City dockyards and quays
(*d*) Amphitheater
(*e*) Gymnasium
(*f*) Library and museum
(*g*) Hall of justice
(*h*) Stadium
(*i*) Aqueduct from the Nile
(*j*) Hippodrome

delta, on a ridge of land between the sea and Lake Mareotis. Its growth was rapid and it speedily became a center of commerce between the East and West, with a population at one time of perhaps 1,000,000. It was especially celebrated for its great library and also for its famous lighthouse, one of the wonders of the world (see LIGHTHOUSE). Under Roman rule it was the second city of the Empire, and when Constantinople became the capital of the East it still remained the chief center of trade; but it received a blow from which it never recovered when captured by Amru, general of Caliph Omar, in 641, after a siege of fourteen months. Its ruin was finally completed by the discovery of the passage to India by the Cape of Good Hope, which opened up a new route for the Asiatic trade.

Modern Alexandria is built on a peninsula which was formerly the island of Pharos. It is divided into two parts, one of which is inhabited by Mohammedans and the other by Europeans. The former portion is crowded and squalid, while the latter is better built, and is supplied with gas, and with water brought by the Mahmudieh Canal from the western branch of the Nile. Its two ports, with fine docks and other accommodations, make it one of the chief commercial ports on the Mediterranean and the great emporium of Egypt. Its trade is large and varied, the exports being cotton, beans, peas, rice, wheat; the imports, chiefly manufactured goods. At the beginning of the nineteenth century Alexandria was an insignificant place of 5000 or 6000 inhabitants, but under Mohammed Ali renewed prosperity began for it. In 1882 the insurrection of Arabi Pasha and the massacre of Europeans led to the intervention of the British and the bombardment of the forts by the British fleet, in July. When the British entered the city they found the finest parts of it sacked and in flames, but the damage was repaired. Population in 1907, 332,246, of whom only about 50,000 were Europeans.

Alexandrian Library, the largest and most famous of all the ancient collections of books, planned by Ptolemy Soter, king of Egypt, who died about 283 B. C. Succeeding rulers developed and enlarged the library, which at its most flourishing period is said to have numbered 700,000 volumes. Most of these were burned at the invasion of Alexandria by the Romans, and the remainder were destroyed by the Christians in 391 A. D. A.MC C.

ALEXANDRIA, LA., a manufacturing and commercial center, with a population of 17,510 in 1920, an increase of 6,297 since 1910. It is the seat of government for Rapides parish, situated in about the center of the state, on the right of the Red River, about 200 miles from its confluence with the Mississippi River. New Orleans is about 170 miles southeast, in a direct line, and 360 miles by water; Baton Rouge is about 113 miles southeast, and Shreveport is 123 miles northwest. The city is served by seven railroads and a river navigation company. The Red River is navigable

throughout the year as far as Alexandria. The town was founded in 1819, received its city charter in 1882 and was named for Alexander Fulton, on whose property the first settlement was made. The commission form of government has been in operation since 1913. The area of the city is two and a quarter square miles.

Alexandria is located in the heart of one of the greatest yellow pine timber belts in the world; forests extend on all sides for a distance of seventy-five miles, and the lumber industry has largely contributed to the growth of the city. About 1,500 people are engaged in this industry. Other enterprises are iron foundries, railroad shops and cotton-seed products, and the cultivation of agricultural products is extensive. The total value of manufactured products in 1920 was $4,350,000. A number of Belgian and Bohemian farmers have successfully raised rice, cotton, cane, alfalfa, vegetables and grains, and these are among the chief shipments. Among the public buildings worthy of note are the Federal building, which cost $100,000; a $90,000 city hall, a $120,000 courthouse, a $125,000 high school, a bank building costing $125,000, and a $1,000,000 hotel. Besides these is a Carnegie library and a hospital. A business college, Roman Catholic and Baptist colleges and a high school serve the educational interests.

The city was almost totally destroyed by fire in 1864, and its subsequent development was due to the construction of the Texas and Pacific Railway to this point in 1882.

ALEXANDRIA, Va., a quaint old city of historic interest in Alexandria County, on the northeastern border of the state and on the Potomac River, six miles south of Washington, D. C. It is a port of entry and a railroad center of importance, on the lines of the Pennsylvania; Atlantic Coast Line; Southern; Seaboard Air Line; Baltimore & Ohio, and Chesapeake & Ohio. Electric lines operate north and south from the city. In 1920 the population was 18,060, an increase of 3,731 since 1910. The area is a little more than one square mile.

Although the city is located 100 miles from the mouth of the Potomac River, it has an excellent harbor a mile wide, which admits the largest vessels. Through its water and railway shipping facilities it controls a large, growing trade, and it is a manufacturing center. There are glass, shoe and broom factories, a thread mill, fertilizer plants, breweries, chemical works and silk mills. Educational advantages are offered by Mount Vernon and Saint Mary's academies and the Theological Seminary and High School of the Diocese of Virginia (Episcopal), in addition to the public schools.

In Old Christ Church George Washington and Robert E. Lee worshipped, and their respective pews are objects of interest to visitors; Marshall House, where Ellsworth, an officer in McDowell's army, was shot after tearing down the Confederate flag; the Town Hall; Carlyle House, General Braddock's headquarters in 1755, the Lord Fairfax House and a Confederate monument are features of interest. Nearby is Mount Vernon, the home of Washington.

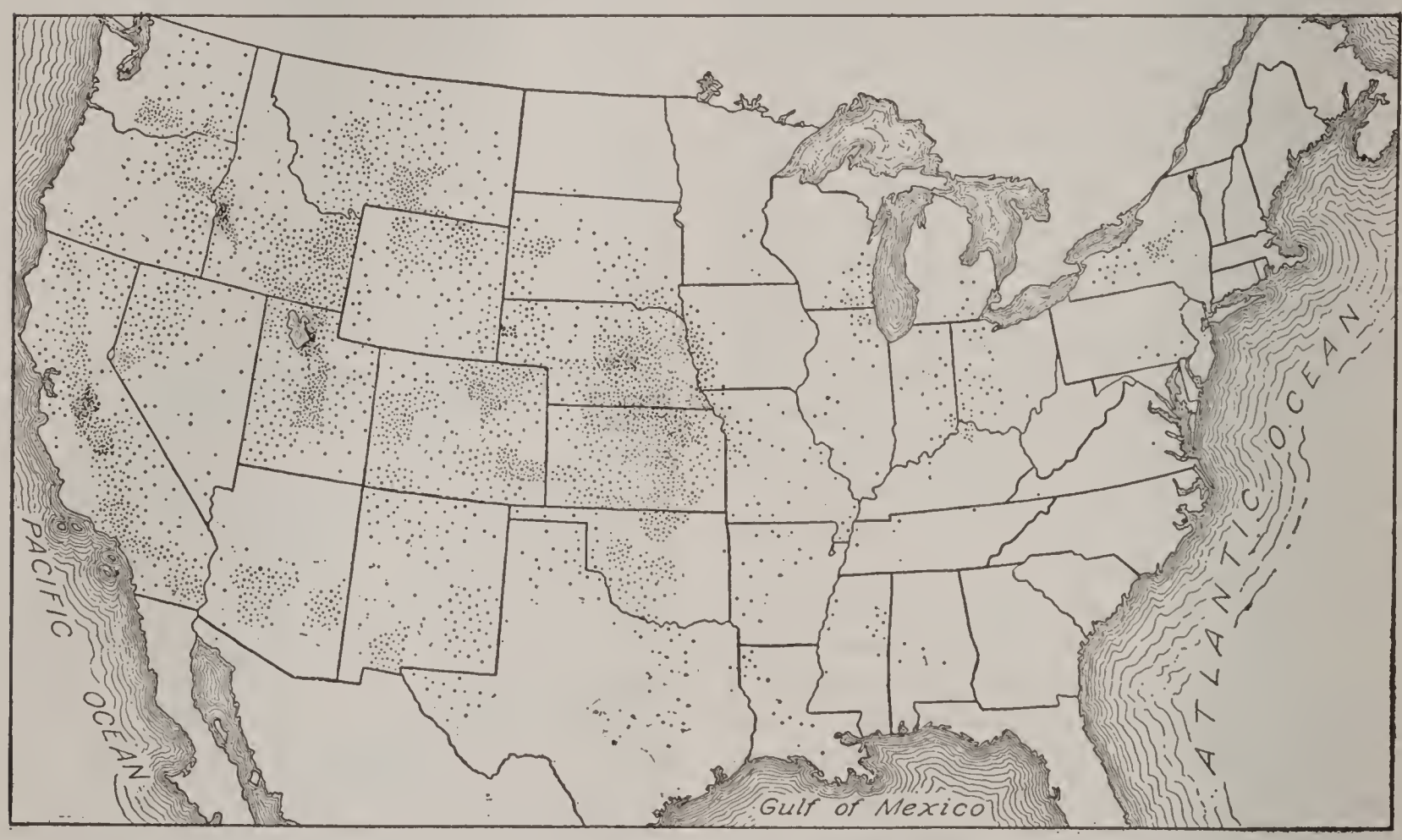
The first settlement was made here in 1695, under the name of Belhaven. In 1749 the town was organized, and it was incorporated in 1779. Alexandria belonged to the territory ceded to the United States for the nation's capital by Virginia in 1789, but it again became part of Virginia in 1847. In 1814, on the approach of the British fleet, the inhabitants, to prevent attack, paid the equivalent of $100,000. It was occupied by Federal troops during the War of Secession and from 1863 until the close of the war was the seat of what is known as the Alexandria Government (see Virginia).

ALEXANDRIAN, *al ex an′ dree an,* **AGE,** the name given to that period during which the Mediterranean city of Alexandria, in Egypt, was the center of Greek learning and culture. It began under the Ptolemies and lasted throughout their rule and into the time of Roman supremacy, thus covering approximately the period from 300 B. C. to 600 A. D. Ptolemy Soter founded the famous library of Alexandria, and his son, Philadelphus, established a sort of academy of sciences and arts to which many scholars and men of genius were attracted. Among the greatest of the men who made Alexandria world famous were Euclid, the father of scientific geometry; Archimedes, great in physics and mechanics; Apollonius of Perga, whose work on conic sections still exists, and the astronomer and geographer Ptolemy, whose system of astronomy was in general use until the middle of the seventeenth century. There were also several poets and philosophers of note.

ALFAL′FA, or **LUCERNE,** *lu sern′,* is a clover-like plant, one of the most important among the world's forage, or fodder, crops ever since it was named al-facfacah, "the best crop," by the Persians more than twenty centuries ago. While it is one of the oldest crops

known to mankind, it was strangely the last to be introduced into the United States and Canada; alfalfa reached the American continent not by way of Europe, as did nearly every other agricultural product of North America, but through California from Chile, in 1854, in the hands of people who were attracted north by the wonderful gold discoveries. A variation of the Persian name has held through the centuries. The name *lucerne* developed from its introduction into the Eastern United States from Lucerne, Switzerland; indeed, in one section of New York state a variety of alfalfa was said to have been introduced as early as 1800, but it was purely a local crop, in irrigated districts, where the quantity of moisture is easily regulated; therefore it will thrive under irrigation in the Arizona deserts, which are among the hottest in the world. It grows as well with little moisture, because of the great length of its roots; fifteen inches a year has been found sufficient, but it also does well in the Gulf states, which have sixty-five inches of rain yearly. The plant dies where the soil is too moist, however, and it will not grow well in a soil with a high per cent of acids.

Alfalfa requires a well-drained and deep soil, rich in lime and quite free from weeds. No other fodder crop requires as much lime as



ALFALFA MAP, UNITED STATES
Heavily-dotted areas indicate sections of greatest production.

not important enough to affect California's claim, from which state its growth spread rapidly. Other local names are French clover, purple medic, Spanish trefoil and Chilean clover.

Conditions of Growth. Almost any crop, if it is to thrive well, requires practically one general variety of soil, a certain average quantity of rainfall and the same average elevation above sea level. Alfalfa is an exception to these conditions; it grows in California below sea level, in a semi-arid region, and it flourishes on the highlands of the mountain states at an elevation of 8,000 feet. So far as climate is concerned it will grow in every state in the American Union. It is a much-favored crop does alfalfa; its presence neutralizes the acidity of the soil. Weeds, being shallow-rooted, rob the plant of the sustenance the surface soil provides, and makes it dependent upon the deep root system to draw its support from far below. Its roots can penetrate a considerable layer of clay, to reach moisture and rich soil beneath it. This characteristic is referred to again, below.

Description of the Plant. Alfalfa grows to a height of eighteen to twenty-four inches, and is much like clover. It belongs to the same botanical family as the clover and beans, lentils, peas and other plants called leguminous, for the reason that they bear legumes, or pods, as seed vessels (see LEGUMINOUS PLANTS). All

legumes are of special value to agriculture, because they draw free nitrogen from the air and store it in the soil. No other group of plants can do this; it is accomplished by certain bacteria found in nodules, or little rounded lumps or knots, on the roots of the plants. The leaves have three-toothed leaflets; the flowers are purplish, with petals like the flowers of the pea; the small seed pods are coiled or twisted into two or three spirals, and the seeds are kidney-shaped, about one-twelfth of an inch long.

The plant is a strong, deep-rooted perennial. In no other farm crop do the roots penetrate so far into the earth; ten to twenty feet is not an uncommon depth, therefore it can resist severe drought. Up to the present time it has been most extensively grown in semi-land, due probably to the large storage of organic matter in the soil. The very deep roots also bring up mineral matter from depths below the roots of ordinary plants. However, it is to be remembered that the alfalfa hay also contains large amounts of minerals, and when the hay crop is constantly removed, exhaustion of the soil results, though temporarily the land will be improved in productivity.

Comparative Value as Fodder. Not only is alfalfa very productive, but ton for ton is more valuable in feeding qualities than any other common hay plants. This is illustrated by comparing the digestible nutrients in 100 pounds of the common hays and wheat bran; the figures were prepared by the United States Department of Agriculture and published in Farmers' Bulletin No. 339, p. 28:

Kind of Forage	Dry Matter in 100 Lbs.	Digestible Nutrients in 100 Lbs.		
		Protein	Carbo-hydrates	Ether Extract
Alfalfa hay	91.6	11.0	39.6	1.2
Clover hay	84.7	6.8	35.8	1.7
Timothy hay	86.8	2.8	43.4	1.4
Wheat bran	88.1	12.2	39.2	2.7

arid regions, where ordinary forage grasses do not succeed, but it will grow even better in humid regions. It grows with remarkable rapidity, and will produce a crop about every 40 days during the growing season; it can be cut from three to seven times a year, dependent upon the length of the season. The usual time for cutting is just as the plant is coming into bloom, when not more than one-fifth of the flowers have appeared.

Effects on the Soil. Alfalfa will not grow unless the bacteria which live in the nodules on its roots are present. In most soils these bacteria must be introduced in some way when alfalfa is sown for the first time. Usually this is done by scattering over the new field soil from a field in which alfalfa has been growing. This is called artificial inoculation. Since alfalfa requires a soil rich in lime, when not of natural limestone formation soils must be artificially limed in order to secure a successful growth. When well established under favorable conditions, alfalfa will continue to produce good crops for a long time; fields have been productive for as long as fifty years.

Alfalfa also improves the productivity of the

It will be noted that alfalfa is almost as valuable a feed for the same weight as wheat bran, and more valuable than timothy and clover.

Other Uses. The yield of honey is largest where bees have the range of alfalfa fields, and, because the plant blossoms several times a year, bees can gather from this source several crops of honey. For poultry alfalfa is valuable; fowls may be given access to the field or the plant may be cut and fed to them. In Oklahoma a manufacturer has used alfalfa in a finely ground state to make candy, and his success has inspired others to still further experiments along unheard-of lines.

Growth in the United States. About ninety-five per cent of the alfalfa crop of the United States is grown west of the Missouri River, but at present the acreage is rapidly increasing in the eastern half of the country, also. Its slow development in the eastern states is probably due partly to the fact that the crop was not readily grown, requiring inoculation of the soil, while it grew quite readily in most soils west of the Missouri River. The eastern states already had good forage crops in timothy

and red clover, while the western states have found no other forage plant that can compete with alfalfa.

Alfalfa yields more hay than any other standard hay plant, as shown by the average yields; alfalfa averages 2.52, timothy, 1.22 tons and clover 1.29 tons of cured hay per acre. In the United States close to 5,000,000 acres are in alfalfa. The average market prices to the growers, in normal times, is $8 per ton, compared to $10.50 for timothy or timothy and clover combined, or $9.25 for clover alone. Among the states Kansas is first in acreage. The first eight states in rank are the following; the figures indicate the number of acres in alfalfa in average years:

Kansas	960,000	Idaho	310,000
Nebraska	690,000	Utah	284,000
Colorado	510,000	Montana	224,000
California	485,000	Oklahoma	210,000

The rank of alfalfa among the forage crops of the United States is indicated in the following table of comparisons; the figures are based upon a ten-year average:

Crop	Acreage	Tons Annually	Tons Per Acre	Value	Value Per Ton
Alfalfa	4,707,000	11,860,000	2.52	$ 93,104,000	7.85
Timothy	14,686,000	17,985,000	1.22	188,085,000	10.46
Clover	2,243,000	3,158,000	1.29	29,335,000	9.29
Timothy and Clover	19,542,000	24,750,000	1.27	257,280,000	10.40
Millet	1,118,000	1,547,000	1.38	11,145,000	7.21

Canada's Crop. In the Dominion of Canada there is little alfalfa, compared with its growth in the United States. Only about 86,000 acres are employed in raising it, but the market price is higher, being between $11 and $12 per ton in normal times. The total production is about 210,000 tons, an average yield of 2.42 tons per acre, worth a total of $2,500,000 yearly.

Ontario was first in alfalfa production in 1914, with an average total of 66,000 acres under cultivation. Alberta is second, with 7,000 acres; British Columbia, third, with 5,500 acres, and Quebec fourth, with 4,000 acres. No other provinces have as yet 3,000 acres, and in some, notably the Atlantic seaboard provinces, not as many as 100 acres are devoted to it. However, the area in alfalfa is rapidly increasing. E.G.M.

Consult various bulletins of the United States Department of Agriculture, Washington, D. C., and of the Canadian Department of Agriculture, Ottawa. These may be had upon request.

ALFIERI, *al fya' re,* Vittori, Count (1749-1803), the greatest dramatic poet that Italy has produced. His dramas seem to some modern critics stilted and artificial, and their lofty sentiments are frequently expressed in somewhat monotonous language; but his high purpose is evident throughout, and his work has moments of real beauty. The Italian people have cause for reverencing him which is beyond mere literary fame. Certain of his plays, as *Virginia, Brutus* and *Timoleone* played a large part in awakening that feeling of Italian unity which was the first step towards a united Italy.

Alfieri was born at Asti, in Piedmont. He traveled much, not always spending his time in a creditable manner, and in 1775 produced his first tragedy, *Cleopatra.* His first taste of fame inspired him, and from that time on he worked with great singleness of purpose. His resting place is worthy of the awakener of Italian patriotism, for he lies in the Church of Santa Croce, between Michelangelo and Machiavelli, and a monument by Canova stands above his tomb.

ALFON'SO XIII, (1886-), king of Spain, son of Alfonso XII and Maria Christina, Archduchess of Austria. Alfonso was long one of the interesting child monarchs of Europe, as his father died before his birth, and he ruled under the direction of his mother until sixteen years of age. Throughout his boyhood his kingdom was in a state of violent disorder, and in 1898 he saw practically the last of Spain's colonies lost in the Spanish-American War.

He took personal charge of the government in 1902, and soon won the affection and confidence of the nation by his sincerity and courage. In 1906 he married Princess Ena of Battenberg, granddaughter of Queen Victoria. He has been on the whole a liberal king, and has used his influence to extend religious freedom in his kingdom. Social and political unrest have continued, however, and the young king has several times been threatened with

assassination, the first attack taking place on his wedding day. Alfonso is a patron of sports

ALFONSO, KING OF SPAIN

of all kinds, and often has to be dissuaded from participating in dangerous pastimes.

ALFRED THE GREAT (849-901), one of the greatest popular heroes the world has ever produced, of whom it has been said that of all the monarchs to whom the title *Great* has been given, no other deserves it in point of character as does Alfred. Much legend has gathered about his name, but the outlines of his real history are well known. He was the youngest son of Ethelwulf, who reigned over the West Saxons from 836 to 858. Alfred came to the throne in 871, and found the country in a desperate state, owing to the inroads of the Danes. He made a truce with them and induced them to turn their attention to the other provinces of Britain, but it was not long before they renewed hostilities, and so successful were their attacks that Alfred fled to the hills and woods for safety. One familiar legend tells how, during this period of hiding, he took refuge in a peasant's hut. No one recognized the king in this ragged and hungry traveler, and the peasant's wife asked him to tend the cakes which were baking before the fire. Wrapped in thoughts of his kingdom, Alfred forgot the cakes, which were burned to a crisp; and the peasant's wife, returning, scolded the king severely and struck him over the head.

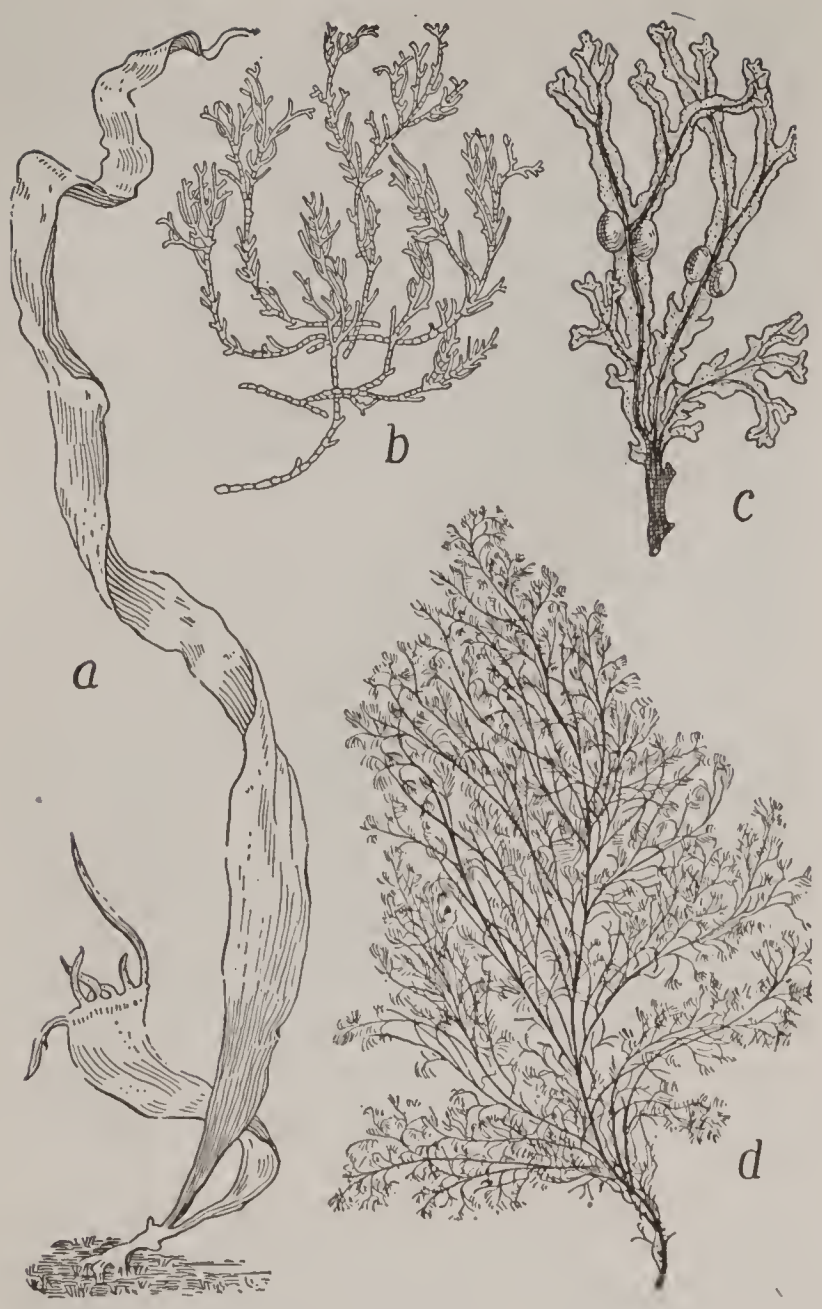
Finally, having been joined by a band of trusty followers, Alfred prepared, in May, 878, to attack the Danish army under Guthrum at Edingdon. It is said that two or three days before the battle he entered the Danish camp disguised as a harper and gained all the information desired respecting the strength and position of the enemy, but this legend is generally discredited. In the battle that followed, the Danes were utterly defeated; Guthrum and his followers accepted Christianity and were assigned territory north of Wessex. Alfred afterward ceded to them the eastern portion or Mercia, which became known as the *Danelagh.* Alfred was now the ruler of nearly all England, though never recognized by title as such.

Years of Peace. During the period of peace which followed, he rebuilt cities and fortresses and improved his fleet. Ships were stationed at intervals along the coast to guard against invasion, and were often useful in repelling the renewed attacks of the Danes. Alfred also established a regular militia, which was able to protect the several parts of the kingdom without leaving any district defenseless. He made a code of laws which served as the basis of later codes, and promoted trade and commerce. His last years were passed in peace. He was succeeded by his son, Edward the Elder.

The selfish ambition and cruelty which have stained the characters of other great rulers are not recorded in the life of Alfred the Great. In the making and administration of laws, in his careful oversight of the courts of justice, in his promotion of the arts of peace, he had the welfare of his subjects ever in view. Of his military genius, the record of obstacles overcome is sufficient witness. He was in belief and in practice a devout Christian. Alfred is conspicuous for the patronage he gave to letters, and his own learning and industrious scholarship are most remarkable. To bring knowledge within reach of his subjects he translated Bede's *Ecclesiastical History of England,* Gregory's *Pastoral Rule* and Boethius's *Consolations of Philosophy,* from Latin into Anglo-Saxon, adding much of his own composition. Alfred represents all that is greatest and best in the early Christian civilization of the West, and was the herald of centuries far removed from him in point of time. A.MC C.

For map of the dominions of Alfred the Great, see ENGLAND. For a more extended account of him, see Snell's *Age of Alfred.*

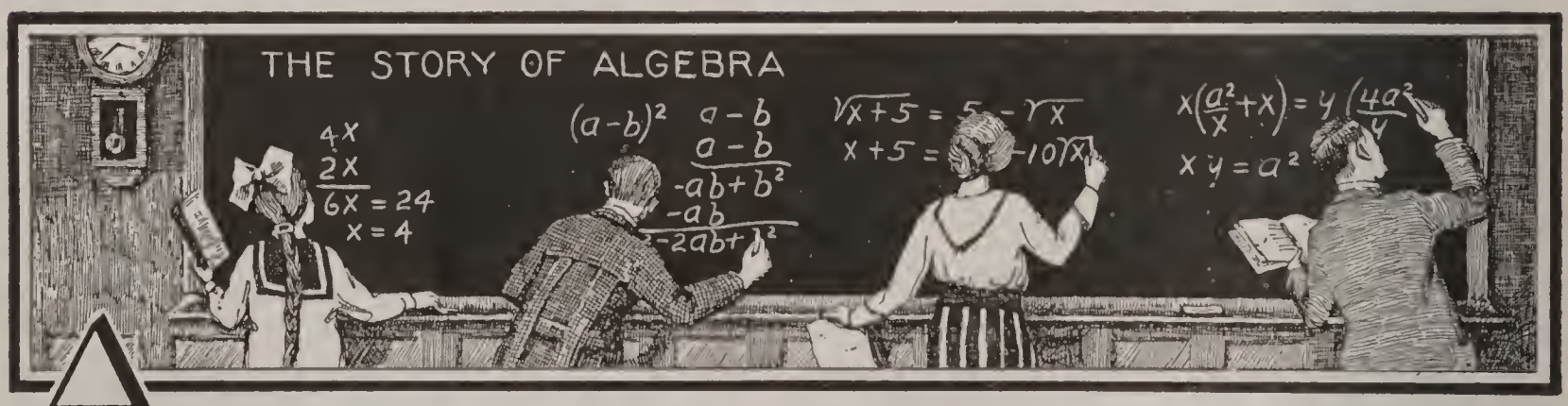
ALGAE, *al' je,* a Latin word which means *seaweed,* and which has been adopted without change as the name for such water-dwellers among plants as do not derive any nourishment through their roots. Some of them live



ALGAE
(*a*) Deep-sea "devil's apron"
(*b*) Deep purple coralline algae
(*c*) Bladder wrack
(*d*) A branching red variety

in fresh water and some in salt, and they vary in size from the microscopic forms to those whose stems resemble the trunks of forest trees, and whose fronds rival the leaves of the palm. The higher species have stems bearing the leaf-like expansions and are often attached to the rocks by roots, but in many species the stems are absent, the whole plant being a mere shapeless, jelly-like mass. As the algae are entirely composed of cellular tissue, many are edible and nutritious, as carrageen, or Irish moss, dulse, etc. Kelp, iodine and bromine are products of various species and the algae are also valuable as manure. About twelve thousand species are known and these are classified in groups according to their color, being recognized as green, brown or red. Most green algae are fresh-water plants, while the brown and red forms are usually confined to salt water.

ALGARDI, Alessandro (1602-1654), an Italian architect and sculptor, born at Bologna. His chief work was done in Rome, where he followed the style of his great contemporary, Giovanni Bernini. Algardi made the tomb of Pope Leo XI, in Saint Peter's, and for the same church a representation of Attila's retreat from Rome. The latter is the largest figure in high-relief in the world. His work as an architect is represented by the facade of the Church of Sant' Ignazio. It is as a sculptor that Algardi will be best remembered.



ALGEBRA. A vital element in teaching is the recognition of *continuity* of subject-matter. Let us find the continuity between arithmetic and algebra, the points common to the two subjects, where algebra touches arithmetic and belongs with it, and where the two subjects are distinct. Insight into these points makes clear the relation and interdependence of elementary school mathematics and early high school mathematics.

Very early in the elementary school the child is solving such problems as these: 7+8=15, 9+7=16; out of this grows 7 and what number make 15, 9 and what number make 16, and so on. Following the form above, the teacher writes 7+(a number)=15, thus translating the problem into good form. This is *algebraic* in thought and form, as well as arithmetical. It very readily becomes $7+n=15$. It should be read freely, as follows:

"A number has been added to 7 and the answer is 15." Then follows the question, "What is the number?" The problem looks like this when completed:

$$7+n=15$$
$$n=8$$

Most arithmetics write it 7+?=15. This is algebra, but the authors fail to use good algebraic expression. The "?" is not good here. The word *number* or some symbol to stand for the word *number,* as *n,* the first letter of the word, is desirable.

In multiplication the child says 6×4=24; 8×9=72. The teacher says, "I multiplied 7 by some number and got 56," and writes as she says it:

$$7\times\text{number}=56, \text{ or,}$$
$$7\times n \quad =56,$$

then asks "What is the number?" The problem appears:

$$7\times n=56$$
$$n=8$$

This is algebra in thought and expression, appearing early in arithmetic.

The area of a rectangle is 63; the length is 9. What is the width? The mathematics of the problem is this: 63 is the product of 9 and some number, and its best expression is, $63=9\times w$. Again this is algebra in thought and in expression, although found in the middle grades of the elementary school. The expression soon takes this form:

$$9w=63$$
$$w=7$$

I need $18 to buy a coat. I have $12. How much more must I get? Such problems come early to the child. It is arithmetic, and it is also algebra, and when given its best expression appears as $12+n=18$; when solved it is:

$$12+n=18$$
$$n=6$$

In all the above illustrations the child meets the *algebraic thought* in his arithmetic, and should be taught the best expression for it, such as given above, which is the so-called *algebraic expression.* Indeed, it is the only *mathematical* expression for such conditions.

The *solution* of each of these problems is *arithmetical.* It is reached directly by logic; it is not reached by the manipulation of an equation, which latter method belongs to algebra. The child says in arithmetic, "If $9w=63$, w equals ⅑ of 63, or 7, or he writes:

$$9w=63$$
$$\therefore w=\tfrac{1}{9} \text{ of } 63, \text{ or } 7.$$

In algebra he says, "$9w=63$." Then he divides each member of the equation by 9 and finds $w=7$. He uses the equation as a machine. He has $9w=63$ as a balance; he knows that if he divides both sides of the balance by 9, the quotients form a balance. Thus it is seen that in the *solutions of the problem lies the great distinction between arithmetic and algebra.*

Farther on in the grades the student finds such problems as this:

An agent working at 13% commission earned $117. What was the amount of his sale?

The mathematics of the problem is this:

$$\$117=\text{Sale}\times.13$$

The solution is:

$$\therefore \text{Sale}=\frac{\$117.00}{.13}$$
$$\therefore \text{Sale}=\$900$$

This is arithmetic or algebra, as you please, in thought and form, but arithmetic in solution.

Another illustration, from seventh or eighth grade:

The area of a circle is 850 (square units, feet, yards, etc.). What is its radius?

$$\text{Area}=\pi R^2$$
$$\therefore 850=\pi R^2$$
$$\therefore R^2=\frac{850}{3.1416}$$
$$\therefore R=\sqrt{\frac{850}{3.1416}}$$

Here we have the best arithmetical thought and form, and so have we excellent algebraic thought and form. Indeed, again we say this thought and form belong not alone to algebra but to arithmetic and to *mathematics* in general.

This has not been recognized because the old "rule method" has been followed through the centuries in arithmetic—the telling how to do the problem, setting forth rules and classifying all problems under these rules. This method calls for no *expression* of the *relations* in a problem, but rather shows and calls for *processes.* Under it, the student begins by adding or dividing or finding square root or whatever the rule dictates. Under the method suggested above (but not common enough to-day) the student attacks the conditions that create his problem, and translates them into mathematical language, which is the language we have so long called *algebraic.* With it as his tools, the student uses the *equation*—the *mathematical sentence*—and the signs and symbols that serve the purpose of placing before the eye the relations that exist in the problem. He does not hesitate to use a letter to stand for a number any more than he does to use +, −, ×, =, and so forth

to stand for words. This mathematical expression is coming into use in the elementary schools through the earnest endeavor of a few of the best teachers of arithmetic. One of the weakest points in the course of mathematics is the lack of a recognized language of arithmetic such as is common to all mathematics beyond arithmetic. This lack is one of the big obstacles to the student beginning algebra.

The high school teacher must take cognizance of this. The translating into mathematical language of the relations existing in a problem is new to the beginning student in algebra, and the teacher must guide him slowly and clearly through his own clumsy product into concise, accurate and refined method and language of the science. The steps are as follows:

First, he must learn to find the *mathematical relations* in the problem he reads; second, he must, by means of mathematical symbols, set forth those relations in the form of an equation; third, he must learn to use this equation as a machine which he must manipulate properly to solve his problem. This is a new view to him and so vital that if he fails to comprehend it he must stumble through stubble fields in his algebra career, while if he gains command of it he will fly as in a finely-constructed machine. The early days or weeks in algebra determine his control of the new method of thinking, and so these early days are vital.

The simple problems in arithmetic given above make good work for the beginning high school student. Below are many further suggestions as to how the student passes on from arithmetic to algebra.

1. He indicates the perimeter of a room which is 17 ft. by 12 ft., thus: $17+12+17+12$, or $(2\times17)+(2\times12)$ or $2\times(17+12)$.

2. He indicates the perimeter of a room 20 ft. long whose width he does not know, thus:

$$20+width+20+width$$
$$20+w+20+w$$
$$(20+w)+(20+w)$$
$$2\times(20+w)$$

The suggestion is given by the teacher that he may drop the sign $\times$ and he writes $2(20+w)$. Tell him that mathematicians have agreed to drop multiplication signs in such cases as this, and between letters and between a digit and a letter, but *expect to repeat it many times,* for he has years of background to the contrary. The new form should come gradually, not be imposed suddenly.

The teacher says, "Show me the area of the floor of the first room," and the student writes, "17×12."

"Show me the area of floor and ceiling." The student writes, "$(17\times12)+(17\times12)$, or $2(17\times12)$."

"Show the area of the second floor." "$20\times w$ or $20w$."

"Area of floor and ceiling." "$(20\times w)+(20\times w)$ or $2\times(20\times w)$ or $2(20\times w)$ or $2(20w)$."

"I paid 45c for melons this morning. I paid c cents apiece. How many did I buy?" "$45\div c$."

Teacher tells him the $\div$ is dropped and the fraction form is used from now on to show division. The student writes $\frac{45}{c}$.

"A dealer sold 1,200 tons of coal for which he received d dollars. For what did he sell it per ton?" The student writes $\frac{d}{1200}$.

"It is m miles from the coal mines to the city of Peoria. I traveled the distance in 16 hours. At what rate did I travel? *Ans.* $\frac{m}{16}$.

"I sold 7000 bushels of corn at n cents per bushel and spent \$320. What had I left?" "$7000n-32000$."

"I worked a number of years at a salary of \$140 per month and my expenses were \$117 per month. What did I save?"

$$(140-117)\times12\times n$$
$$(140-117)\times12n$$
$$(140-117)12n$$

Perhaps by this time many of the class will write the last form immediately, but do not fear to go back and forth from the algebraic to the arithmetical form. It does much to clarify and give real and lasting meaning to the new form.

Below are suggestions for making situations that would give rise to certain mathematical expressions:

$$n+\frac{n}{3}=6500$$
$$n-\frac{3n}{7}=64$$
$$900-(600+n)$$

The teacher directs: "Give a situation that would be expressed by each of the above." Students will give widely different problems:

1. A man collected a certain sum of money Aug. 1 and ⅓ as much on Aug. 2, and collected both days \$6500.

2. A man spent ⅜ of his month's salary and had \$64 left.

3. A farmer had 900 bushels of grain and sold 600 bushels at one market and n bushels at another. How many bushels had he left?

The teacher and children should express for each other algebraically situations they have in mind, and each try to fit situations to the other's expressions. Then each one should tell what situation he had in mind when he set down the expression.

When the student has learned to translate a problem into an equation, he has accomplished the first big step in algebra. The second step is a study of the meaning, use and control of the equation, the algebraic machine. The equation as a machine is a new thought to the student. Indeed, in arithmetic he has violated with impunity the law of balance in the expression of his problems, and he may do so as long as he keeps awake to the relations in his problem regardless of the form; but in algebra he places himself at the mercy of the equation; having once made it, he surrenders to it to take him where it will. This is all new to the beginning algebra student; indeed, this subject is a veritable fairy land; the magic wand is no greater wonder than this same equation which takes up his burden, releases his mental energy and carries him through to the end if he but manipulates each crank and button skilfully.

The solution of an equation depends upon (1) changing the equation to desirable form to find the value of the unknown quantity, and (2) keeping the balance through all changes made in form.

The Negative Quantity. Another element in algebra new to the student beginning algebra is the *negative quantity;* the idea that number extends on both sides of zero above and below is indeed new to him. The idea of the negative quantity can be illustrated in various simple ways:

1. A force acting in opposition to a force which is having a desired effect.
2. A debt.
3. Money spent when one desires to save.
4. Being carried west when one desires to travel east.
5. Game—"tug of war." The force exerted by each side is negative considered from point of view of opposing side.
6. Friction as opposed to moving force.

The combination or so-called addition of positive and negative quantities presents only a simple problem.

1. A group of boys are playing at moving a small wagon some distance north. Three boys pull north, one with a force of 12 pounds, another 16 pounds, another 20 pounds; another pulls south 18 pounds, another pulls south 14 pounds. Combine the forces and the result shows $^{+}12+{}^{+}16+{}^{+}20+{}^{-}18+{}^{-}14={}^{+}16$. The wagon moves with a force of 16 pounds in the desired direction. Many algebras do not use the small sign, and in these the problem would appear $12+16+20-18-14=16$.

2. Four brothers go into partnership to assume the debts of all and use the money of all. A has \$7,000 and owes \$9,000. B has \$20,000 and owes nothing. C has no money and is in debt \$2,000. D has \$30,000 and his debts are \$4,000. What is the result of the combination? Using small signs it appears: $^{+}7000 + {}^{-}9000 + {}^{+}20000 + {}^{-}2000 + {}^{+}30000 + {}^{-}4000$, or:

$$\begin{array}{r} +7000 \\ -9000 \\ +20000 \\ -2000 \\ +30000 \\ -4000 \\ \hline \end{array}$$

A negative quantity will cancel or destroy an equal positive quantity and vice versa.

3. The thermometer was at 12° above zero at 10 A.M. It rose 17°, and then fell 9°. Indicate the changes and result, or combine the forces. $^{+}12+{}^{+}17+{}^{-}9={}^{+}20$.

Subtraction of negative numbers may be made clear.

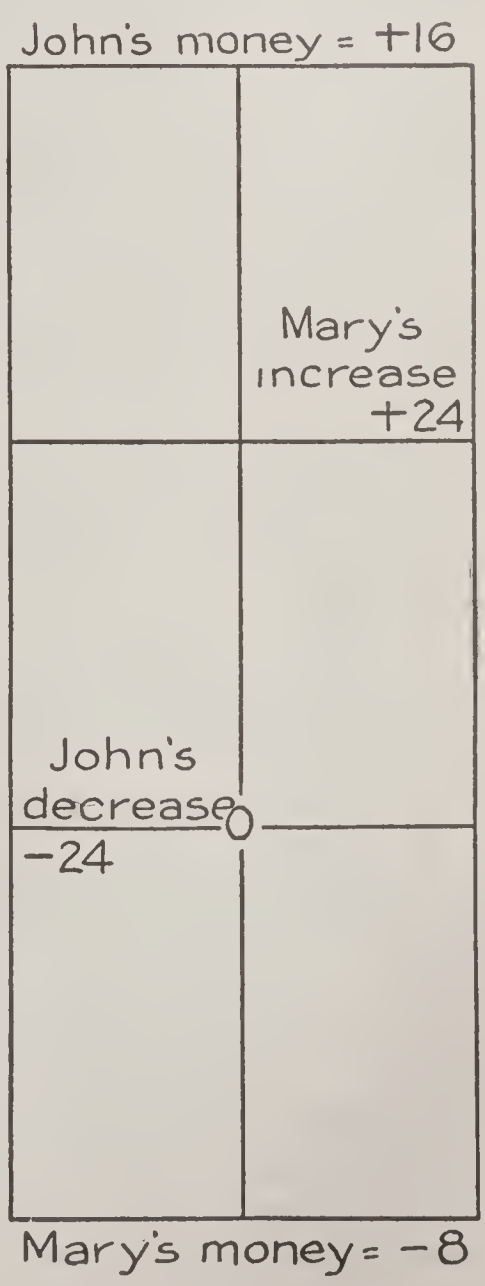
(1) John has \$16 and Mary has no money, but owes \$8. What must happen to John that he may reach the same state as Mary? What must happen to Mary to reach John's state?

(1) —24 shows John went down, or lost 24.

(2) +24 shows Mary gained 24.

$$\begin{array}{rl} (1) & -8 \\ & +16 \\ \hline & -24 \end{array}$$

$$\begin{array}{rl} (2) & +16 \\ & -8 \\ \hline & +24 \end{array}$$



Ques. How far apart are they? *Ans.* 24 points.

Ques. What direction does John go? *Ans.* Negative.

Ques. How far? *Ans.* 24.

Then answer showing distance and direction. What is the difference between John's and Mary's financial standing? *Ans.* —24.

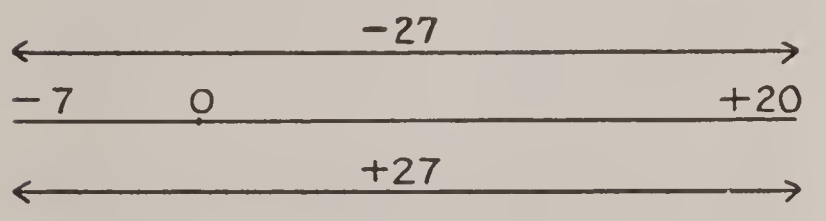
Between Mary's and John's? *Ans.* +24.

The first means that John must lose or get rid of in some way, 24. The second means that Mary must gain 24.

These would appear when set down in ordinary subtraction—

(1)	(2)
— 8	+16
+16	— 8
—24	+24

Show difference between —7 and +20.



(1) Go from +20 to —7. *Ans.* —27.

(2) Go from —7 to +20. *Ans.* +27.

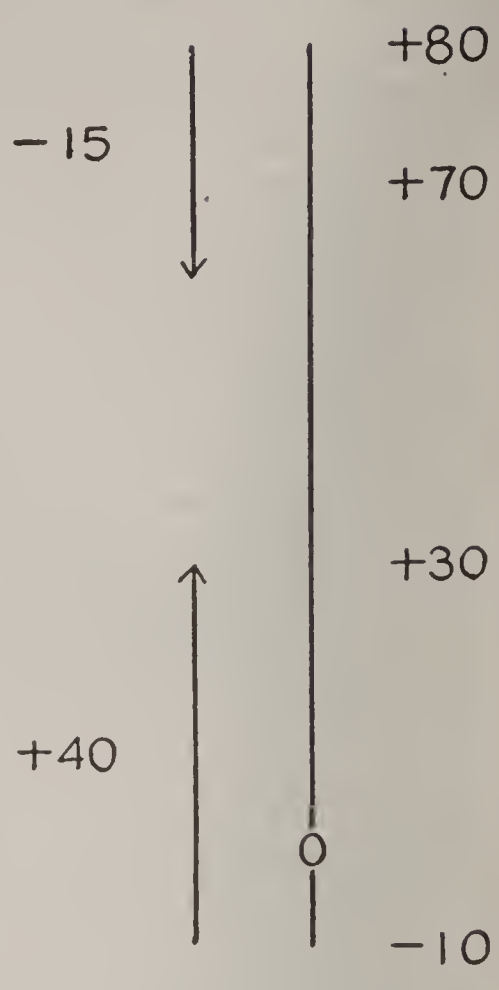
The thermometer was at 85° at noon, and at 70° at 6 P.M. Change? —15.

Thermometer was at 10 below at midnight and at 30 above at 10 A.M. What was the change?

There was a rise of 40:

+30
—10
+40

Such problems may have infinite variety. A.H.



The Foundations of Algebra

In this treatment of the subject it is possible merely to explain fundamental principles, and to show how simple and reasonable the boy or girl can find this hitherto unknown science. There are many new things to be learned that were not treated in arithmetic; the reason for the existence of every new principle is not at all difficult to understand, and if the young student masters each principle in turn the entire subject may become a delightful recreation.

Signs and Symbols. The signs used in arithmetic are carried into algebra without change of form and with meaning changed only in one particular:

+ (plus) indicates addition;

— (minus) indicates subtraction, and it has also a new significance, for it designates negative number;

× (times) indicates multiplication;

÷ (divided by) indicates division, and

= (equals) is the sign of equality. Whatever appears on one side of this sign in an algebraic problem is exactly equal in quantity, number or amount to that which appears on the other side of it. See *Simple Equations,* below.

In algebra, parentheses, braces and brackets are called *signs of aggregation,* because everything within a pair of any of them is to be treated as a single quantity, which is to be simplified (reduced to its simplest expression) before being incorporated into other parts of a problem. Their treatment may thus be explained:

$[12+\{4+5-(5-3)+4\}-4]$=what number?

We must first simplify the inside group (5—3); after doing so the problem is stated in new form:

$[12+\{4+5-2+4\}-4]=?$

Again simplifying the term within the inside signs, the problem becomes:

$[12+11-4]=?$ *Ans.* 19.

This problem is purely arithmetical. When applied to algebra there is no change in principle. Having observed the solution above, solve the following, which is purely algebraic:

$[5a+6a+\{5a-a+(3a+4a)\}-a]=?$

If $a=4$, what is the numerical value of the series?

Coefficient. The beginner in algebra at once finds a much-used term not employed in arithment—the word *coefficient.* As usually understood it means any number or letter placed before another letter, and it indicates multiplication; a coefficient, then, is a *multiplier.* Thus, in the term $5a$, 5 is the coefficient of a, and indicates that the value of a is to be taken 5 times. After becoming a little more familiar

with the principle it will be seen that a as well as 5 is a coefficient—that 5 may be taken a times. So, really, 5 is the coefficient of a, and a is the coefficient of 5. To apply the principle further, in $a(x+y)$, a is the coefficient of $(x+y)$ and $(x+y)$ is the coefficient of a.

Signs of Parentheses. In the above paragraph we have learned that if several numbers or letters are to be treated as a single expression they are joined together by being enclosed in parentheses. There are two rules laid down for guidance in treating such aggregations. The first is usually stated in this form:

If an expression within parentheses is preceded by the sign +, the parentheses can be removed without making any change in the signs of the expression, and without altering values.

It is a simple matter to prove this to be true. Let us do it in this way:

If a man has 40 dollars and later collects 8 dollars and then 2 dollars, it is immaterial whether he adds the 8 dollars to his 40 dollars, and afterwards adds the 2 dollars, or whether he adds to his 40 dollars the sum of 8 dollars and 2 dollars.

The first process may be represented thus: $40+8+2$.

The second process may be represented thus: $40+(8+2)$.

Hence, $40+(8+2)=40+8+2$.

Again, if the same man has 40 dollars and later collects 8 dollars and pays a debt of 2 dollars, it is immaterial whether the 8 dollars be added to the 40 and the debt be paid out of the sum, or whether the 2 dollars be paid out of the 8 dollars and the remainder be added to the 40 dollars.

In the first case the process is represented by $40+8—2$.

In the second it is represented by $40+(8—2)$.

Hence, $40+(8—2)=40+8—2$.

Prove that you understand the principle by simplifying the following:

$$5+(8—4)=5+8—4.$$

The simple form is $9=9$.

$$4+(8—2)+(6+1)=4+8—2+6+1.$$

There should not be the slightest difficulty in employing the above rule. The second needs a little deeper study:

If an expression within parentheses is preceded by the sign —, the parentheses can be removed, provided the sign before each term within the parentheses is changed, the sign + to —, and the sign — to +.

The first illustration, now that we are familiar with it, may be used with one variation, in explaining this second rule:

If a man has 40 dollars and has two bills to pay, one of 8 dollars and one of 2 dollars, it is immaterial whether he takes the 8 dollars and 2 dollars one after the other, or whether he takes the 8 dollars and the 2 dollars at one time from the 40 dollars.

We may represent the first process by $40—8—2$.

We may represent the second by $40—(8+2)$.

Hence, $40—(8+2)=40—8—2$.

If this man has his 40 dollars in the form of five-dollar bills, and has a debt of 8 dollars to pay, he can do so by giving two bills (10 dollars) and receiving 2 dollars in return.

We may represent this process by $40—10+2$.

If the bill paid is 8 dollars, that is, $(10—2)$ dollars, the number of dollars remaining may be represented by $40—(10—2)$.

Hence, $40—(10—2)=40—10+2$.

To make sure your understanding of the above, solve the following:

$6—(4—2)=?$
$9—(4+3)=?$
$(6—2)—(5—2)=?$
$12—(8—3—2)=?$
$15—(6—2+3)=?$
$(14a-2a)-(6a-2a)=?$

Numerical Values of Letters. Referring again to the term *coefficient,* we recall that a coefficient is a multiplier. Thus, in the expression $8a$, a, no matter what its value may be, is to be taken 8 times. It follows then that if $a=3$, the expression $2a+3a=6+9$, or 15; or, $2a+3a=5a$, or 15. When no coefficient is expressed it is understood to be 1; $a=1a$, $b=1b$, etc. Apply these facts in the solution of the following problems. In a few instances results are stated to make the mastery of the principles easier.

If $a=4$, $b=3$, $c=2$, find the value of:

1. $8a—3bc$. (*Ans.,* 14; in this case b and c are to be multiplied together, and 3 is their coefficient).
2. $4ac+5a$.
3. $2(a—b+c)$.
4. $b+3(a—c)$. *Ans.,* 9.
5. $4b—2(a+c)$.
6. $8c—b(a—b)$.

The last problem is here solved step by step. Compare with your own solutions and see if your methods are correct:

(1) $8c—b(a—b)$.

(2) Removing parentheses, we have $8c—ab+b^2$; b times b is not $2b$, but b^2, because b is multiplied by itself.

(3) Assigning values to the letters,

$16—12+9$.

Adding the terms with plus signs, and subtracting from their sum the term having a minus sign,

(4) $25—12=13$.

Addition. The processes by which problems in addition are solved algebraically are much like those employed in arithmetical addition. When in arithmetic we add 4 and 6 we get a term expressing the result of this addition; it is 10. In algebra if we add a and a we obtain the term $2a$ for a sum. If, however, we add a and b, we obtain no single term which will express this sum. To express the addition of algebraic quantities which are *unlike* we connect the quantities with the sign $+$. To express the addition of algebraic quantities which are *like*, or *similar*, we add their coefficients. For example, $2x$ plus $3x$ plus $4x=(2+3+4)x=9x$. But x plus y plus $z=x+y+z$. Whenever two or more unlike quantities are added the operation is algebraically complete when the quantities are connected by the sign $+$.

Add $3a$, $4b$, $6a$ and b. In this problem like terms are used twice. We must combine these before completing our addition that we may have the expression in its simplest form. Combining similar terms:

$$3a+6a=9a.$$
$$4b+\ b=5b.$$

The addition completed is expressed:

$$3a+4b+6a+b=9a+5b.$$

The problem may be given this form:

$$\begin{array}{r} 3a+4b \\ 6a+\ b \\ \hline 9a+5b \end{array}$$

In the illustrative problems given above, all the terms have the plus sign expressed or understood. (When no sign is expressed the sign $+$ is always understood.) In the following problems note that some of the terms have minus signs. In each case arrange like terms under each other in columns. Add like terms having plus and minus signs separately, then subtract the quantity representing the larger sum from that representing the lesser.

Add: $2a^3-b^2c+6bd^2+2d^3$; $4a^3+3b^2c-4bd^2-3d^3$; $3a^3+2b^2c+2bd^2-4d^3$; $-2a^3-8b^2c+6bd^2+6d^3$.

Arranging the terms in columns and adding:

$$\begin{array}{r} 2a^3-\ b^2c+\ 6bd^2+2d^3 \\ 4a^3+3b^2c-\ 4bd^2-3d^3 \\ 3a^3+2b^2c+\ 2bd^2-4d^3 \\ -2a^3-8b^2c+\ 6bd^2+6d^3 \\ \hline 7a^3-4b^2c+10bd^2+\ d^3 \end{array}$$

An explanation of any column will make these operations clear. Suppose we take the second, which contains the term b^2c. Adding the terms having the plus sign, we have $3b^2c$ plus $2b^2c$; their sum is equal to $5b^2c$. Adding $-b^2c$ and $-8b^2c$, we obtain $-9b^2c$; $-9b^2c$ plus $5b^2c$ equals $-4b^2c$. The quantity obtained in adding two like terms having unlike signs always takes the *sign of the greater.*

Solve the following:

1. Add: $4x^3+3y+5z$; $-2x^3+2y-4z$; $3x^3-8y-z$.
2. Add: $-3a-2b-c$; $a+3b-2c$; $3a-6b+c$.
3. Add: $3a+4b+7y$; $2b-3a+2y$; $2a-5b-7y$; $2a+2b+2y$.

Subtraction. It is sometimes difficult for the beginner in algebra to understand the reason for the rule for algebraic subtraction. We will state it here as it is usually given, and then explain it step by step, using practical problems for illustration. The rule is:

> Set the like terms one under the other in the minuend and subtrahend, then change all the signs of the subtrahend and proceed as in addition.

We have learned the principles underlying addition, and know that the algebraic sum of $8a$ and $-4a$ equals $4a$.

$$\begin{array}{rl} 8a & \text{first quantity} \\ -4a & \text{second quantity} \\ \hline 4a & \text{sum.} \end{array}$$

In adding in arithmetic we know that if either of two numbers be subtracted from their sum, the difference must be the other number. Here, then, if $-4a$ is subtracted from $4a$, the remainder must equal the first number, which is $8a$. This is simply an application of an arithmetical truth, that in addition, if either of two terms is subtracted from their sum, the result, or remainder, is the other term; though the result may look unreal, it must be correct because the above rule is correct.

Let us show further proof: If we add $-8a$ and $4a$ the sum is $-4a$:

$$\begin{array}{rl} -8a & \text{first number} \\ 4a & \text{second number} \\ \hline -4a & \text{sum.} \end{array}$$

Subtract $4a$ from $-4a$, and the remainder, if the rule of arithmetic is correct, must be $-8a$, for $-8a$ is the other number.

Again, the sum of $-8a$ and $-4a$ is $-12a$, and the remainder must be the first term, $-8a$.

This will be made clearer if these last three problems in subtraction are placed side by side:

Minuend	$4a$	$-4a$	$-12a$
Subtrahend	$-4a$	$4a$	$-4a$
Remainder	$8a$	$-8a$	$-8a$

It should be borne in mind that in these problems in subtraction the algebraic sum of each subtrahend and remainder equals its minuend. These are therefore the correct solutions of the problems given above.

It is advisable to learn the shortest method to use in subtraction and to know the simplest rule to be applied. By examining the above problems we see that in each case we could have found the same remainder if we had imagined the signs in the subtrahends to have been changed and the minuends and subtrahends then added. Apply the following rule to each of the three solutions:

Arrange the problem so that like terms in the minuend and subtrahend will be one above the other; change all the signs in the subtrahend from + to — and from — to + and proceed as in addition. The result will be the remainder sought.

Multiplication. We have already learned that when we write down any number of algebraic quantities together without joining them by the plus and minus signs we indicate multiplication. That is, a times b=ab. When we set down graphically the product of $abcd$ and bc^2dy we find that b is taken twice as a factor, c three times, a once, y once and d twice. The result of our multiplication, in expanded form, is $abbcccddy$, or, simplified, $ab^2c^3d^2y$.

The small figures at the right of and slightly above the letters are known as *exponents;* each indicates the number of times the letter is to be used as a factor; b^2 means the *square* of b, that is, b multiplied by itself or raised to the *second power.* When a letter is written without any exponent, as b, we understand that the first power of the letter is meant. That is, $b=b^1$. It is clear, then, that when like quantities are multiplied, their exponents are added. Thus, $b^2\times b=b^{2+1}=b^3$. But $a^2\times b^2=a^2b^2$. We can combine exponents of like quantities only.

Now let us take a more complicated problem for solution:

$$\begin{array}{r} 5b^2c\ +2d \\ 3bd \\ \hline 15b^3cd+6bd^2 \end{array}$$

It happens that the signs in this problem are all +. Let us see what steps to take when minus signs occur. Find the product of $-5a^2b$ and $3a$. Since $-5a^2b$ indicates that $5a^2b$ is to be subtracted, then multiplying $-5a^2b$ by $3a$ is the same as subtracting $5a^2b$ $3a$ times, or subtracting the product of $5a^2b$ and $3a$ once. The product, therefore, is $-15a^3b$.

Let us analyze another problem. Multiply $-5a^2b$ by $-3a$. Multiplying these quantities is equivalent to subtracting $-5a^2b$ $3a$ times. It must be remembered, however, that in subtraction the sign of the subtrahend is always changed; so, in subtracting $-5a^2b$ $3a$ times, we have the equivalent of adding $5a^2b$ $3a$ times, or of adding the product of $5a^2b$ and $3a$ once. Therefore the product is $15a^3b$.

Note the results in the following, where the operations are placed side by side:

$$\begin{array}{r} 5a^2b \\ 3a \\ \hline 15a^3b \end{array} \qquad \begin{array}{r} -5a^2b \\ 3a \\ \hline -15a^3b \end{array} \qquad \begin{array}{r} 5a^2b \\ -3a \\ \hline -15a^3b \end{array} \qquad \begin{array}{r} -5a^2b \\ -3a \\ \hline 15a^3b \end{array}$$

It is evident, from the above, that when the signs in the multiplier and multiplicand are alike the product is a positive quantity and has the sign +; when the signs in the multiplier and multiplicand are unlike the product is a negative quantity and has the sign —.

The following solution indicates the steps taken when the multiplier and multiplicand have more than one term:

$$\begin{array}{r} a^2-2ab+b^2 \\ a-\ b \\ \hline a^3-2a^2b+ab^2 \\ -\ a^2b+2ab^2-b^3 \\ \hline a^3-3a^2b+3ab^2-b^3 \end{array}$$

The following problems may be solved for practice:

1. Multiply $4a-3b$ by $3a+4b$.
2. Multiply a^2-ab+b by $3a+b$.
3. Multiply x^2+2x+y by $x-y$.
4. Multiply $x^4+2x^2y^2+y^4$ by x^2-y^2.

Division. We learned that in multiplying, exponents of like terms in the multiplier and multiplicand are added; in division, which is the reverse of multiplication, the quotient is obtained by subtracting the exponents of like terms in dividend and divisor.

Divide b^3 by b.

$$\frac{b}{b^3}\ \Big|\ \frac{b^3}{b^2}$$

Proof: $b^2\times b=b^3$. Also, $b^3\div b=b^{3-1}=b^2$.

This division may also be shown thus:

Divide b^3 by b.

$$b^3=bbb.$$

Divide bbb by b.

$$\frac{bbb}{b^1}=bb.$$

$$bb=b^2.$$

Divide $3x^4y^2z - 9x^3yz^2 - 6x^2y^3$ by $3x^2y$.

Solution:

$$\frac{3x^4y^2z}{3x^2y} - \frac{9x^3yz^2}{3x^2y} - \frac{6x^2y^3}{3x^2y} =$$

$$x^2yz - 3xz^2 - 2y^2$$

In long division, for convenience in multiplying, it is customary to write the divisor at the right of the dividend. The following is an acceptable form:

$$\begin{array}{l|l} 12a^2+18ab+6b^2 & 4a+2b \\ \underline{12a^2+\ 6ab} & \underline{} \\ \ 12ab+6b^2 & 3a+3b \\ \ \underline{12ab+6b^2} & \\ \end{array}$$

We find by inspection that $4a$, the first term of the divisor, is contained in $12a^2$, the first term of the dividend, $3a$ times. Multiplying this partial quotient $3a$ by the entire divisor, placing the product under the first two terms of the dividend and subtracting, we obtain $12ab$. We bring down and add to this remainder the next unused term ($6b^2$) in the dividend. By inspection we find that the first term of the divisor is contained in the first term of the new dividend $3b$ times. We multiply the entire divisor by $3b$ and obtain $12ab+6b^2$. Subtracting this product from the new dividend, we obtain no remainder and know that our division is complete.

The signs in the above problem are all plus.

Note the solution of the following problem, in which minus signs occur:

$$\begin{array}{l|l} a^2-2ab+b^2 & a-b \\ \underline{a^2-\ ab} & \underline{} \\ \ -ab+b^2 & a-b \\ \ \underline{-ab+b^2} & \\ \end{array}$$

Note that when we divided the first term in the new dividend, $-ab$, by the first term in the divisor, a, we obtained as a quotient $-b$. Whenever a negative term is divided by a positive term, or a positive by a negative, the sign of the quotient will be minus. But a minus term divided by a minus term gives a positive quotient. Briefly stated, like signs produce plus, and unlike signs produce minus quantities.

Solve for practice the following:

1. Divide $9x^2-18xy+9y^2$ by $3x-3y$.
2. Divide $a^2-12a+35$ by $a-5$.
3. Divide $3x^4-10x^3y+22x^2y^2-22xy^3+15y^4$ by $x^2-2xy+3y^2$.
4. Divide $a^5-2a^4-4a^3+19a^2-31a+15$ by a^3-7a+5.

Simple Equations. Two or more terms connected by the sign of equality (=) form what is known as an *equation*. The principles upon which the solutions of equations are based may be readily understood by using the familiar

THE BALANCE SCALE

balance scale as an illustration. Suppose we have such a scale as is shown in the accompanying picture. In one pan we place a ten-pound weight; in the other we place a six-pound and a four-pound weight. The first weight, we know, balances the other two, and this fact may be indicated by the following statement:

$$10=6+4.$$

Suppose we add 5 pounds to each pan. Then our statement is modified to read,

$$10+5=6+4+5.$$

If we now remove 3 pounds from each pan we have:

$$10+5-3=6+4+5-3.$$

From these statements, or equations, we may see that the following principles are true:

1. The same quantity may be added to both sides of an equation, or be subtracted from both sides, without changing the value of the equation.
2. We may multiply or divide each side of an equation by the same quantity without changing the value of the equation.

By the application of these rules we may find the numerical values of unknown quantities. In the equation $10a+2=32$ we have stated that 32 is 2 more than $10a$, or that to $10a$ we must add 2 to equal 32. If we wish to ascertain the number to which $10a$ is equal we must subtract 2 from 32. Since we may subtract the same number from both sides of

an equation and still preserve its equality, we may write:

$$10a+2-2=32-2.$$

This is equivalent to $10a=32-2$.

Simplifying, $10a=30$.

Dividing both sides by 10, $a=3$.

These operations are fundamental in what is known as *transposition.* When we change the form $10a+2=32$ to the form $10a=32-2$, we transpose a known quantity from one side of the equation to the other, and in doing so we *change its sign.* In the solution of simple equations by transposition we work with two principles: known quantities are placed on one side of the equality sign and unknown quantities on the other; any quantity may be transposed from one side to the other if its sign is changed. As we learned above, when we transpose a quantity we are really adding it to both sides of the equation or subtracting it from both sides. Let us see how these facts are applied in the solution of practical problems:

1. A ditch 80 feet long is divided into two parts in such a way that one part is three times as long as the other. What is the length of each part?

As the length of neither part is known, we may represent the number of feet in the shorter part by x. The solution is stated thus:

Let x = number of feet in shorter part.
$3x$ = number of feet in longer part.
$x+3x$, or $4x$, = number of feet in total length.
$4x=80$.
$x=20$, number of feet in shorter part.
$3x=60$, number of feet in longer part.
Proof: $60=3\times20$. $60+20=80$.

2. Find a number such that when 14 is added to twice the number the sum will be 64.

If we represent the number to be found by x, we know that twice the number must be $2x$. Since 14 added to double the number equals 64, our next statement must read,

$$2x+14=64.$$

Applying the rules we have just learned, we have,

$$2x=64-14,$$
$$2x=50,$$
$$x=25, \text{ required number.}$$

Solve the following problems, using the above explanations as your guide:

1. The sum of two numbers is 60, and the greater is five times the less. What is each?
2. A man divided 75 dollars between two sons. To A he gave twice as much as to B. How much did each receive?
3. Four times a certain number is equal to the number increased by 36. What is the number?
4. John bought a certain number of apples. Had he bought three times as many he would have had 20 more than the original number. How many did he buy?
5. An orchard yields 140 bushels of fruit. Hint: Let x = number of bushels of peaches, is 15 more than the number of bushels of pears. Find the number of bushels of each.
6. A farm of 160 acres was divided into three sections. The first was twice the size of the second, and the second three times the size of the third. What was the acreage of each?
7. A 45-acre farm was divided into three garden plots. The first was half the size of the third and the second half the size of the first and third combined. How many acres in each?

Problems Dealing with Two Unknown Quantities

As the next step in our work we take up equations in which two unknown quantities occur. Though such problems are more complex than the ones given above, their solution is not difficult if the philosophy of the simple equation is clearly understood.

Usual Methods. In solving problems involving two unknown quantities several methods may be used to eliminate the unknowns. To eliminate an unknown quantity is to find its numerical value; the new value is then placed in the original equation as a substitute for the original unknown quantity. The methods most commonly used are elimination by *addition* or *subtraction,* and elimination by *substitution.* There are other methods, but they are less frequently employed than the ones explained here.

By Addition or Subtraction. Let us examine step by step the process of finding the value of two unknown quantities by the first method. This method is usually the simpler and easier of the two.

$$\text{Solve} \begin{cases} 3a+4b=34 \\ 6a+3b=33 \end{cases}$$

It is clear that if the first equation is multiplied by 2, it will be in such form that the first term will equal the first term of the second equation. The entire product will read: $6a+8b=68$. If we subtract the second equation from the first as it now stands, we will have a remainder of $5b=35$. The value of b is then easily found. The various steps of the process are shown in the following statements:

(1) ..... $3a+4b=34$
(2) ..... $6a+3b=33$

(3) Multiplying (1) by 2..... $6a+8b=68$
(4) Bringing down (2)..... $6a+3b=33$

(5) Subtracting ..... $5b=35$
(6) ..... $b=7$

Having found the numerical value of b, it is an easy matter to apply that value in either of the original equations; in other words, to substitute in equation (1) or equation (2) the value of b.

Since we know that b equals 7 we use the value of $4b$, or 28, in the first equation, so that our statement now reads: $3a+28=34$. In order to get both known quantities on the same side of the equality sign we must transpose the 28. Then we have, $3a=34-28$; $3a=6$, and $a=2$. The formal statement for the completion of the problem is:

(7) Applying the value of b in (1) $3a+28=34$
(8) Transposing ..... $3a=34-28$
(9) Then ..... $3a=6$
(10) And ..... $a=2$
(11) Proof .....$3a$, or 6, $+4b$, or 28, $=34$

For practice, solve the problems given below, using either addition or subtraction to eliminate unknowns. The beginner will find it helpful to write out each solution fully, putting down the steps in order and thus making himself familiar with the principles involved.

1. Solve $\begin{cases} 4x+3y=25 \\ x+12y=40 \end{cases}$

2. Solve $\begin{cases} 3x+y=16 \\ 2x+2y=20 \end{cases}$

3. Solve $\begin{cases} x+5y=34 \\ 4x+3y=51 \end{cases}$

Elimination by Substitution. By this is meant the process of clearing an equation of one of its unknown terms by substituting in either equation the value of one of its unknown terms, as in the following solution:

$$\text{Solve} \begin{cases} 2a+5b=31 \\ 3a+4y=29 \end{cases}$$

We will first transpose $2a$ in the first equation and thus get a statement for the value of b.

Transposing $2a$, we have $5b=31-2a$, and $b=\frac{31-2a}{5}$

Now we write the second equation of the problem, placing the new value of b in it. We thus have:

$$3a+4\frac{(31-2a)}{5}=29$$

Before this equation can be simplified it must be cleared of fractions, as follows:

$$3a+4\frac{(31-2a)}{5}=29$$

$$3a+\frac{(124-8a)}{5}=29$$

$$15a+124-8a=145.$$

Transposing the known quantities to the right of the equality sign, we have:

$$15a-8a=145-124, \text{ or } 7a=21.$$

The following statements show the entire process step by step:

(1) ..... $2a+5b=31$
(2) ..... $3a+4b=29$
(3) Transposing $2a$ in (1) and dividing by 5..... $b=\frac{31-2a}{5}$
(4) Substituting the value of b in (2)..... $3a+4\frac{(31-2a)}{5}=29$
(5) Clearing of fractions... $15a+124-8a=145$
(6) Transposing..... $15a-8a=145-124$
(7) ..... $a=3$
(8) Substituting the value of a in (3)..... $b=\frac{31-6}{5}$
(9) ..... $b=5$

For practice, solve the following problems, using the method of eliminating by substitution:

1. Solve $\begin{cases} 3x+6y=24 \\ 5x-3y=1 \end{cases}$

2. Solve $\begin{cases} 5x-3y=8 \\ 2x+2y=32 \end{cases}$

3. Solve $\begin{cases} 5x-y=14 \\ 11x+2y=77 \end{cases}$

Problems Involving Three Unknown Quantities

Problems involving three unknown quantities, though a little more complicated, present no special difficulties, for they may be solved by applying the rules for elimination to two of the given equations, and when the values of two unknown quantities are found, these may be substituted in connection with the third unknown quantity. The full solution of such a problem is given below:

$$\text{Solve} \begin{cases} x+y+z=10 \\ 3x+2y+4z=33 \\ 10x-3y-3z=9 \end{cases}$$

(1) ..... $x+y+z=10$
(2) ..... $3x+2y+4z=33$
(3) ..... $9x+3y-3z=18$
(4) Bring down (2)..... $3x+2y+4z=33$
(5) Multiply (1) by 3..... $3x+3y+3z=30$
(6) Subtract (5) from (4).... $-y+z=3$
(7) Multiply (2) by 3..... $9x+6y+12z=99$
(8) Bring down (3)..... $9x+3y-3z=18$
(9) Subtract (8) from (7).... $3y+15z=81$
(10) Multiply (6) by 3..... $-3y+3z=9$
(11) Add (9) and (10)..... $18z=90$
(12) Therefore ..... $z=5$
(13) Substituting the value of z in (6)..... $-y+5=3$
(14) ..... $-y=-2$, or $y=2$
(15) Substituting in (1)..... $x+2+5=10$
(16) ..... $x=10-7$, or 3
(17) Proof ..... $3+2+5=10$

Solve the following problems, testing in each instance the correctness of your work:

1. Solve $\begin{cases} x+2y-z=10 \\ 3x+4y-5z=4 \\ 5x+y+z=38 \end{cases}$

2. Solve $\begin{cases} 2x+y-z=10 \\ 6x-3y+4z=63 \\ 9x-y-6z=4 \end{cases}$

3. A merchant sold to a customer 8 yards of silk and 4 yards of gingham for 18 dollars; at the same rate he sold to another customer 5 yards of silk and 10 yards of gingham for 15 dollars. What was the price of each per yard?

The conditions of this problem may be stated algebraically as follows:

Let x=number of dollars one yard of silk costs,
and y=number of dollars one yard of gingham costs.
Then $8x+4y=18$
$5x+10y=15$

These equations are solved according to the rules that have been given in the preceding paragraphs.

4. Three numbers have the following relations: three times the first plus the second plus twice the third equals 38; four times the first minus the second plus three times the third equals 40; and the first plus three times the second minus the third equals 12. What are the numbers?

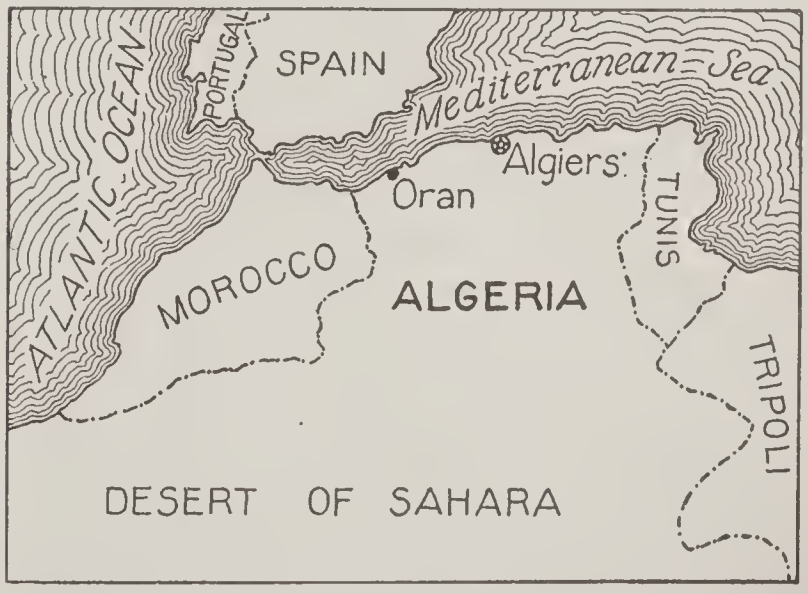
Advanced Algebra. The basic principles of algebra have been covered in the preceding paragraphs, and if you have mastered the explanations therein given you will be able to take up more advanced work. The subjects of fractions, factoring, highest common divisor and least common multiple can be mastered by anyone who has an intelligent understanding of those subjects from the view-point of arithmetic, and from them the student may work through the subject of quadratic equations.

The study of algebra can be made as absorbing as that of astronomy or literature, and it also offers exceptional opportunities for mental discipline, since it can be mastered only with persistent attention to detail and demands accuracy and concentration in the highest degree. B.M.W.

Nearly all school-book publishing houses have several good texts on algebra for beginners, specializing in these as well as in more advanced text-books. Any such publisher (names can be secured from teachers or county superintendent) will be glad to give advice upon the subject.

ALGER, *ahl' jur* or *awl' jur,* HORATIO (1834-1899), an American author of books for boys, whose *Ragged Dick, Tattered Tom* and *Luck and Pluck* series have been sold by the hundreds of thousands. As the names suggest, they deal with penniless heroes who, by goodness, as well as "luck and pluck," reach success. Alger was for a time a Unitarian preacher, but becoming especially interested in the lives of self-supporting boys gave up his pastorate to help such boys, as well as to write about and for them.

ALGERIA, *al je' ri a,* a country of about 343,500 square miles, in Northern Africa, with 650 miles of Mediterranean seacoast on the north, and with Morocco and Tunis on the west and east. It is nearly as large as the combined states of Ohio, Indiana, Illinois, Wisconsin and Michigan. The southern boundary is indefinite and unimportant, merging into the



ALGERIA
The country has no definite southern boundary, nor does it need one, for French influence prevails throughout the region.

arid lands of the great Sahara Desert. The country has a population of 5,800,974 (1921). It has belonged to France since 1830, but has always been a liability rather than an asset to

the French, except that the position of France among the powers of Europe is strengthened by its ownership. It gives present indication of developing into a profitable colony.

The Country and the People. The Atlas Mountains traverse the country in irregular lines from east to west, with a few elevations which reach 7,000 feet, but which average half that height. In the northern and central sections the valleys and low plateaus are fertile and contain the homes of most of the people. Close to the coast, in a belt 100 miles wide, is the most fertile and populous region, called the *Tell.* The southern section merges into the vastness of the desert, where the population is limited to possibly 100,000 wandering, clannish people.

The natives are Berbers (which see); they are often regarded as descendants of the Numidians, a theory which is probably correct, as present-day Algeria was a part of ancient Numidia. More numerous than these are the Arabs, and there are also a considerable number of Jews, who are more influential in the country's affairs than their numbers would indicate. All except the latter are of the Mohammedan faith.

Attractive Features. The average tourist seldom goes to Algeria, but the visitor there may enjoy a wide range of experience. As a winter resort the country is not excelled, so far as climate is concerned; snow remains on the mountain peaks until May, but on the plateaus, along parallels of latitude with Atlanta and Los Angeles, the temperature is delightful most of the year. Lower down intense heat is experienced. Those who wish to see desert conditions may do so, under circumstances as favorable as in most sections, by caravan routes to the very numerous oases (see OASIS). The people are worth studying; only a few hours from highly-developed Europe are native customs and characteristics which have changed little with the passing of time.

Resources. The usual minerals of mountainous regions are abundant. Iron is extensively mined, and large capital finds profitable investment in this industry. Lead, copper, zinc, marble and mercury add to the mineral wealth. The Mediterranean fisheries are important, including profitable sponge and coral industries.

The raising of figs, dates, oranges, lemons and olives is increasing at a remarkable rate, and this, with added activity in mining, explains why Algeria is sure to be within a brief time a profitable colony for France. The country produces more to-day than at any time since the Romans owned it before the Christian Era, when it was one of the famous granaries of the ancient world. To-day the production of wheat, barley and oats is important, but the tropical products excel all others. Europeans manage nearly all the enterprises of the colony; they number over 750,000, or one in seven of the total population.

Government. France keeps in very close touch with the government of its colony. The Governor-General, the ruler of Algeria, is appointed in Paris, and the three departments into which the colony is divided send representatives to the French National Assembly. This body makes the laws for Algeria. The Arab inhabitants have chiefs of their own, but the government takes no account of these and exacts the same obedience from its Arab as from its French subjects.

History. Modern Algeria was the *Numidia* of the Romans, and, as a colony of the Empire, prospered and developed a high state of civilization. The Vandals, however, put an end to its prosperity in A.D. 440, and little was then heard of it until the Mohammedan conquest in the eighth century. Arabs migrated to the country, and the Mohammedan religion became firmly established.

When the Moors were driven from Spain in 1492 by Ferdinand and Isabella, many of them settled in Algeria, and from that time on for centuries the country was known to outside peoples chiefly as the home of pirates who were greatly to be feared. The United States, in common with other nations, at one time paid tribute money to the outlaws of the Barbary States to insure safety for its commerce. By the beginning of the nineteenth century the daring of these pirates had become a real menace to the Christian powers, and efforts to suppress them were constant, but in vain. Finally, in 1815, Commodore Decatur succeeded in forcing the *dey,* or ruler, of Algeria to admit that the United States flag was inviolable, and in the next year an English fleet wrung from Algeria a treaty which promised the cessation of piracy and the liberation of all Christian slaves. These promises the pirates constantly broke, and in 1830, after a French consul had been grossly insulted by the dey of Algeria, the French sent a fleet which reduced the country to utter dependence. It was many years before the insurrections were all put down, however, and the country brought to the point where any real progress was possible.

Since 1871 a civil government has taken the place of the military system necessary up to that time.

Algeria is much interested in all plans for the development of the continent of Africa, and its government is pushing plans to assist in the commercial advancement of vast areas. A railroad is projected from the Algerian coast southward through the wastes of the Sahara to Lake Chad and then towards the Belgian Congo and British South Africa. Work on this line may not be commenced before 1920; the War of the Nations may delay it even longer, because of financial difficulties, but it is one of those vast projects which will one day help to make the "Dark Continent" an enlightened country.

Other Points of Interest. The nomadic Arab tribes do not really own any land, but tradition has assigned to each tribe a certain territory within which it may wander.

During the summer months the sirocco, a hot, dry wind, blows across Algeria, filling the air with fine sand.

There is an extraordinary boiling spring, called by the natives "the accursed bath," which legend declares came into existence suddenly to punish a sheikh who had sinned.

There are many cork trees in Algeria, and the income from cork is considerable.

In the central part of the country there are numerous salty lakes, known as *shats,* which dry up in summer and leave a layer of salt.

The name *Tell,* applied to the most populous region, is an Arab word meaning *hill.*

The coast of Algeria has always been known as an unusually dangerous stretch—the ancient Romans spoke of its "savage sea and inhospitable shore." But the French government, by its excellent lighthouse system, has done much to lessen its dangers.

Forest fires do great damage in Algeria. Government reports state that in some years over 6,000,000 trees are damaged or ruined.

The highest point in Algeria is 7,600 feet above sea level.

There are 50,000 more asses than horses in Algeria, despite the fact that Arabs are always thought of as riding "fiery steeds."

Goats and sheep are by far the most numerous animals, there being almost eight times as many sheep and more than three times as many goats as cattle. E.D.F.

Consult Statt's *The Real Algeria;* Wilkins's *Among the Berbers of Algeria.* These are English publications; there are no American books for recommendation, owing to the remote American interest in the subject.

Outline and Questions on Algeria

I. Position

(1) Latitude, 30° to 37° north
(2) Longitude, 2° 10′ west to 8° 50′ east

II. Size

(1) Length, 550 miles from east to west
(2) Breadth, 320 to 380 miles
(3) Area, 225,000 square miles

III. Country and Inhabitants

(1) Fertile coast region
(2) Atlas Mountains
(3) Desert regions
(4) The natives

IV. Climate

(1) In mountains and uplands
(2) In lower sections

V. Resources

(1) Minerals
(2) Fisheries
(3) Agriculture

VI. Government and History

(1) Early conquests
(2) Piracy
(3) Interference by the United States and France
(4) French government

Questions

What is the "Tell," and why is it so called?

Why are Algeria and the other countries of North Africa known as the Barbary States?

How does this country compare in size with the Canadian province of Saskatchewan? With the largest state in the American union?

Compare its population with that of each of these divisions.

How do the Berbers compare morally with the Arabs?

Why did the French interfere in Algeria?

What are *shats?*

Give two reasons why it would be safer to approach the Algerian coast now than a century ago.

What is the "accursed bath"?

Why is not Southern Algeria as thickly-settled as the northern part?

With what ancient country was Algeria identified?

Has Algeria always been a profitable colony to its owner?

What change is taking place in this respect?

What is the attitude of France toward the Arab chiefs?

Does Algeria make its own laws?

What attractions has the country to offer to tourists?

ALGIERS, *al jeers',* a fortified seaport on the African coast of the Mediterranean Sea, formerly the most important Moorish city, now capital of the French colony of Algeria. It is advantageously situated partly at the foot and partly on the slopes of a hill overlooking the Bay of Algiers. The ancient Moorish section on the hill above the modern portion preserves the characteristics of Oriental cities many centuries old. The modern city is a gay, electric-lighted watering place, thronged with visitors. The streets are broad and well kept, and there are many fine squares. Prominent structures are the Roman Catholic Cathedral, the Military academy and its astronomical observatory. Although changeable, the climate is very healthful, and particularly desirable for invalids. Parisian manners and customs have been transported to Algiers, which is said, though incorrectly, to be "more French than Paris."

The harbor and docks have been greatly improved since the French occupation of the city in 1830. Extensive commerce is carried on with France, Italy, England, Spain and other European countries. Algiers exports flour, esparto, wine, olive oil and fruit, and is the most important coaling station on the Mediterranean Sea. In 1921 the population was 206,595.

TWO SCENES IN ALGIERS
A street in the native section, and a public square in the modern part of the city.

ALGOL, *al' gahl,* in astronomy, a variable star in the constellation Perseus, forming part of "Medusa's Head," which in the account in mythology Perseus carried in his hand, to turn his enemies to stone. The name is derived from the Arabic *al ghul,* meaning the *ghoul* or *destroyer.* For more than a century it was known to be variable and was a puzzle to astronomers. It has now been ascertained that Algol loses five-sixths of its brightness at regular intervals of three days. The diminishing process lasts four and one-half hours, and the full brilliancy is recovered in a further three and one-half hours. This is accounted for by the presence of a satellite revolving about the star and partially obscuring it when directly in line between it and the earth. Measurements show that the diameter of Algol is 1,160,000 miles; that of the satellite, 840,000 miles, and that the two are about 3,250,000 miles apart. Algol has a density equivalent to that of a cork, and a mass about two-thirds that of the sun. The distance of Algol from the earth is so great that it cannot be expressed in figures. See PERSEUS; MEDUSA.

ALGONKIAN, *al gon' ki an,* **SYSTEM,** the term used by the United States Geological Survey to specify a great layer of rocks lying between the Archean System, below, and the Cambrian, above. Algonkian is used synonymously with the term *Proterozoic,* which has been adopted by many geologists (see GEOLOGY). It is the first, therefore the lowest, layer of those rocks in the earth's crust which were formed from sediment deposited at the bottom of large bodies of water and hardened into rock. Such rocks are known as *sedimentary.* They contain few fossils, indicating a meager development of life at the time of their formation, but on the other hand proving the existence of life. Outcroppings of the Algonkian System appear in the Lake Superior region, in Southwestern Minnesota, Missouri, Texas, and in the Rocky Mountains. Most geologists call the period in which they were formed the Proterozoic Era, meaning the *time*

of earlier life. See ARCHEAN SYSTEM; CAMBRIAN SYSTEM; also PALEOZOIC ERA; ROCKS.

ALGON'QUIAN, INDIANS, *al gon' ki an,* the largest family of tribes in the United States and Canada, both in colonial days and at the present time. They first inhabited the land from Labrador southwest to the Carolinas and Tennessee, and west to the Mississippi River, surrounding the Iroquois and bordering on the Siouan tribes to the west and south, and the Athapascan tribes to the northwest. Though originally of a rather peaceable disposition, their New England representatives resented the depredations of the colonists, and wherever they met the English, long and bloody wars followed, until the natives were either extinguished or driven across the Alleghanies. Throughout the French and Indian wars they fought stubbornly against the English, but in the end found themselves confined to scattered reservations west of the Mississippi. To-day there are about 90,000 Algonquians in existence, of whom about 41,000 live in the United States and the remainder in Canada.

ORIGINAL ALGONQUIAN TERRITORY

The various tribes were located approximately in the sections indicated:

(*a*) Chippewa
(*b*) Sauk and Fox
(*c*) Kickapoo
(*d*) Illinois
(*e*) Shawnee
(*f*) Ottawa
(*g*) Potawatomi
(*h*) Miama
(*i*) Powhatan
(*j*) Delaware
(*k*) Pequot
(*l*) Narraganset

Corn was a great staple among the Algonquians, who cultivated the soil about their permanent homes of bark and logs. Among the chief tribes of this family are the Algonquin, whose name has been adopted for the entire stock, the Abnaki, Micmac, Passamaquoddy, Narraganset, Pequot, Delaware, Ottawa, Ojibwa, Cree, Miami, Illinois, Kickapoo, Shawnee, Potawatomi, Arapaho, Menominee, Sauk, Fox and Cheyenne. The greatest chiefs of the Algonquians—King Philip, Pontiac, Tecumseh and Black Hawk—are treated in these volumes. For the manners, customs and history of the Indian race, see INDIANS, AMERICAN.

Consult Dellenbaugh's *The North Americans of Yesterday.*

ALGON'QUIN PARK, a forest and game preserve in Ontario, only a few miles from the valley of the Ottawa River, once the hunting grounds of the Algonquian Indians (which see). It was formerly called Algonquin National Park, but it has always been owned by the province of Ontario. Its area of 2,060 square miles is in the heart of one of the wildest regions in North America. Yet this region, much of it primitive forest untouched by man, is easily accessible, being only 200 miles by rail north of Toronto, and from sixty to seventy miles east of the shore of Georgian Bay. The Park has an altitude of 1,500 to 2,000 feet, and is dotted with more than a thousand lakes of various sizes, practically all of which are abundantly stocked with trout, bass and other fish. Deer are common, moose are frequently seen, and smaller game, including birds, is plentiful. The park is said to have more beaver and otter than any other section of equal area in America. No hunting is permitted in the park, but the nearby territory is a sportsman's paradise.

ALHAMBRA, *al ham' brah,* the most splendid example of Moorish art in Europe, is an ancient palace and fortress of the Moorish kings of Granada in Southern Spain, situated on a terrace on the southeastern border of that city. The Moors built a citadel on the site of the Alhambra in the ninth century, as a protection against their Christian enemies. In 1248, after Granada had become the capital of the few remaining Moorish dominions in Spain, this was rebuilt, and additions were made up to the year 1354, when numerous halls and buildings had been erected. The name *Alhambra,* meaning in Arabic, *the red,* is probably taken from the sun-dried bricks that compose the outer wall. Thirteen towers rise upon this wall, which encloses an area of thirty-five acres. Within the enclosure are gardens made beautiful by fountains and waterfalls, trees and fragrant flowers, and the singing of a multitude of nightingales.

The Alhambra was captured in 1492 by the

Spanish monarchs, Ferdinand and Isabella, in the same year that they started Columbus on his voyage of discovery. Though it has suffered at the hands of spoilers and from the marks of time, it is still a wonderful work of art, and the beauties of the palace have been copied by many artists and architects of later times. An interesting account of the Alhambra is given in Washington Irving's *The Alhambra.*

Consult Irving's *The Alhambra;* Calvert's *Granada and the Alhambra.*

ALIAS, *a' li as,* a legal term for the name assumed by a person who wishes to hide his identity. Thus *Henry Morgan, alias Harry Nicol, alias Paul West* is the description in law for a man whose true name is Henry Morgan, but who has at times called himself by the other names, to avoid attracting the attention of the police, or for a similar questionable reason. This description would be the one to be used in an *alias writ* for his arrest (see WRIT). A pen name or stage name is not considered an alias, but a *nom de plume.*

ALI BABA, *ah' le bah' ba,* the hero of the *Arabian Nights'* tale of *Ali Baba and the Forty Thieves,* who opened the door of the thieves' cavern by using their magic password, "Open sesame." The life of Ali Baba was saved by the slave Morgiana, who poured boiling oil in the jars where the robbers lay hidden. See ARABIAN NIGHTS.

ALIBI, *al' i by,* a Latin word meaning *elsewhere,* is applied to a defense used in lawsuits, whereby a person accused of a crime attempts to show that he could not have committed the deed because he was in a different place at the time. If he succeeds in this proof he is said to *establish an alibi.* An alibi supported by true evidence is the best possible means of proving the innocence of one accused, but this mode of defense also offers the guilty an alluring opportunity of escape by the introduction of false witnesses and perjury.

ALICE'S ADVENTURES IN WONDERLAND, a book for children which contains some of the most delightful juvenile reading ever put in print. It was written by Charles L. Dodgson, under the pen name of LEWIS CARROLL, and purports to be a narrative of the dream of little Alice, a most charming and natural child. The author has kept throughout the book the child's point of view, and the White Rabbit, the Dodo, the Duchess, the Mocking Turtle and the March Hare are characters which are alive to every boy or girl who reads the book. *Alice in Wonderland* and its sequel, *Through the Looking-Glass,* have been illustrated by several artists, but none of the later pictures are as entirely satisfactory as the original ones by Tenniel.

ALIEN, *ayl' yen,* a person residing in one country, but owing allegiance to another. Thus, an Englishman may live in the United States for many years, but unless he transfers his allegiance by naturalization (which see), he is still, in the view of the United States, legally an alien. The position of aliens differs in various countries, but generally they owe a local allegiance and are bound equally with citizens to all rules for the preservation of order. They have no political rights, but in case of need they may be compelled to serve in the militia or do police duty. As a rule they may acquire, hold or dispose of property, both real and personal, in any way open to citizens, except that in some states foreigners can own real estate no longer than six years. This is true throughout the British Empire, but in the United States a few states have not granted such rights to aliens.

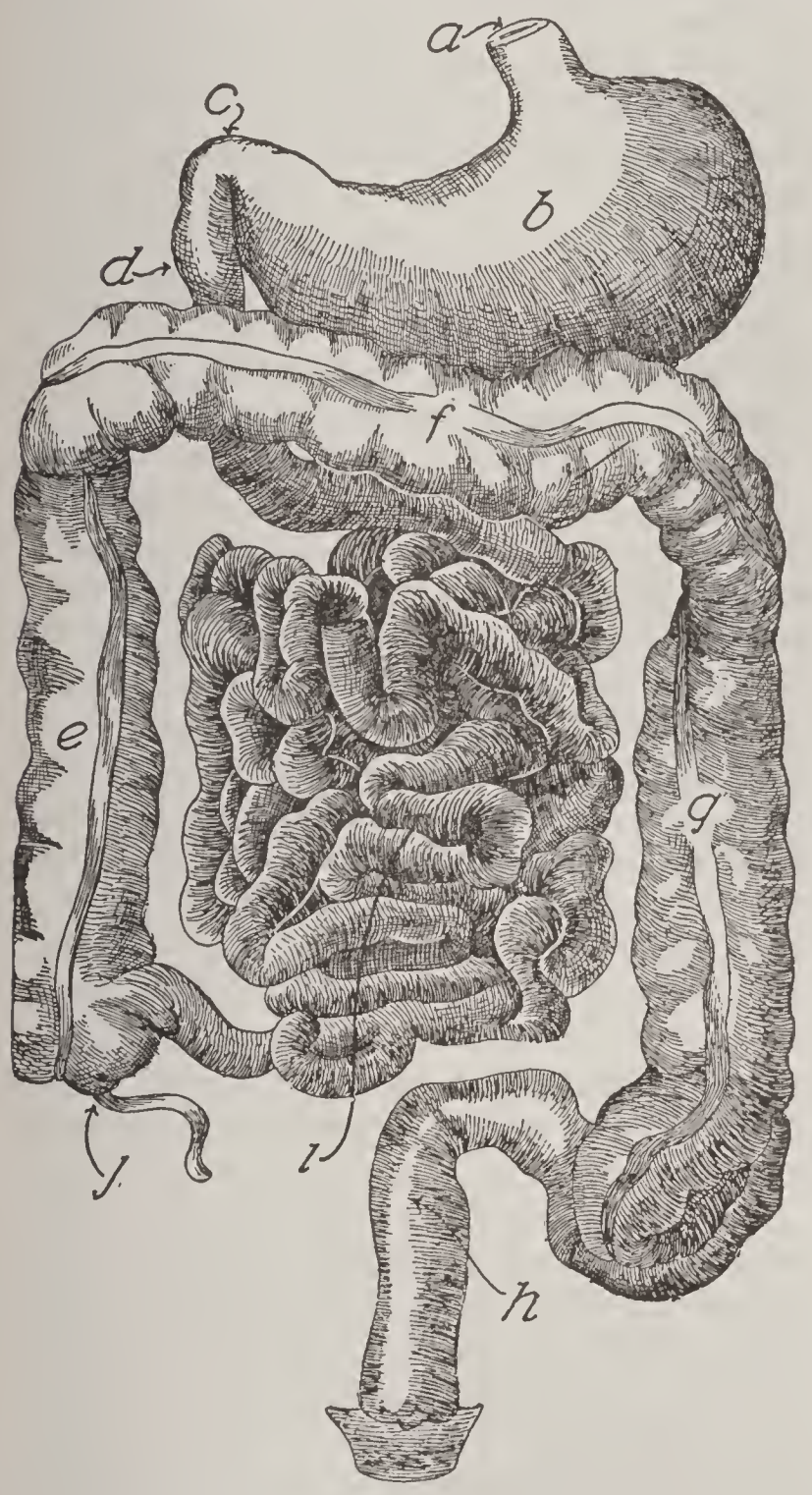
Occasionally, as in the California law of 1913 prohibiting Japanese from owning land, a state law violates a treaty made by the United States government with a foreign nation. The prevailing opinion seems to be that in such a case the Federal government has the power to force the state to change its law, for the Constitution states that all relations with foreign powers are retained in the hands of the general government.

ALIEN AND SEDITION LAWS, four statutes enacted by the Congress of the United States in 1798, during the Presidency of John Adams. The Alien Act, which remained in force for two years, gave the President power to order out of the country any people not citizens whom he considered dangerous to the government; and if they failed to leave promptly they were subject to imprisonment. The Sedition Act was passed in July, 1798, and remained in force until March 3, 1801; it imposed a fine not exceeding $5,000 and imprisonment for not more than five years as a penalty for conspiring to resist government measures or for publishing libelous or scandalous statements concerning Congress or the President. A third law included harsh provisions applying to alien enemies, and a fourth made fourteen years' residence the qualification for naturalization (which see).

These laws were passed chiefly to suppress violent opposition to the administration, and

also to end the movement, begun by Genet, which sought to secure American aid for France in its war with England (see GENET). Their extreme character, however, aroused great indignation, led to the Kentucky and Virginia Resolutions (which see), and was partly, if not chiefly, responsible for the decline of the Federalist party. See ADAMS, JOHN.

ALIMENTARY, *al i men' ta ri,* **CANAL,** a long tube which receives and digests the food taken into the body. It is about thirty feet long in an adult, or five or six times his height, and is lined throughout with soft, reddish mu-



PARTS OF THE ALIMENTARY CANAL

(*a*) Lower end of œsophagus
(*b*) Stomach
(*c*) Pylorus
(*d*) Duodenum
(*e*) Ascending colon
(*f*) Transverse colon
(*g*) Descending colon
(*h*) Rectum
(*i*) Convolutions of the small intestines
(*j*) The *caecum,* with the vermiform appendix

cous membrane. This is a thin skin which contains glands having the power to originate liquids which help in digestion. Outside the mucous membrane are layers of muscle and tissue which strengthen the alimentary canal and push the swallowed food along its course.

The alimentary canal begins at the mouth and includes the pharynx, œsophagus, stomach and the small and large intestines. The small intestine for about ten inches from the stomach is called the *duodenum;* for the next eight feet it is called the *jejunum;* and for the remaining eleven feet, the *ileum.* The small intestine opens into the side of the large intestine by a slit-like valve. The beginning of the large intestine is a small pouch called the *caecum;* leading from the caecum is a small tube a quarter of an inch in diameter and two inches long, called the *vermiform appendix,* but the latter cannot be considered a part of the alimentary canal. Extending upward to the ribs from the *caecum* is the *ascending colon;* the intestine then crosses the abdomen to the left side, forming the *transverse colon;* a section about six inches long passing downward is called the *descending colon.* The last section of the large intestine is the *rectum.* See INTESTINES; STOMACH; DIGESTION.

ALIZARIN, *a liz' a rin,* a substance chemically abstracted from madder root, forming a coloring matter exceedingly valuable for dyeing. It produces various shades of red, of which the most popular is "turkey" red. The more modern process of obtaining alizarin from the refuse of coal tar has caused the cultivation of madder to be almost entirely abandoned, though it is still found growing wild in most tropical countries. See MADDER.

ALKALI, *al' ka ly.* This Arabic word originally meant the ashes of certain plants called in English *saltwort* and *glasswort.* Its meaning was then extended to the most characteristic constituents of the *lye* made by treating the ashes of plants (for instance, wood ashes) with water, and then to a class of substances resembling these two constituents of lye, namely, *potassium carbonate* (potash, pearl ash) and *sodium carbonate* (soda, soda ash). Solutions of these two substances soften animal and vegetable tissues and therefore feel slippery to the fingers. Upon many vegetable and artificial coloring matters they have the opposite effect from acids. For example, they turn red litmus blue, and colorless phenolphthalein pink. They neutralize acids, forming salts, and act upon fats, making soap and glycerine.

When lime is added to a solution of sodium (or potassium) carbonate, a precipitate is formed. When this is allowed to settle, the

clear liquid remaining is found to be a much more active lye than the original solution, and if the water is evaporated off, the white substance left is found to be much more soluble in water than the original carbonate. This product is called a *caustic alkali,* since it not merely softens but actually dissolves animal tissues. The caustic alkalies are the hydroxides (compounds with hydrogen and oxygen) of the metals of which the *mild alkalies* are the carbonates. The majority of modern writers on chemistry limit the term *alkali* to the caustic alkalies, but speak of all substances that effect litmus similarly as being alkaline or having *an alkaline reaction.* In addition to sodium and potassium, the elements lithium, rubidium and caesium have hydroxides which are caustic alkalies. These five metals, accordingly, are known as the *alkali metals,* or *metals of the alkalies. Ammonia water,* which resembles the caustic alkalies in its chemical action, is called the *volatile* (that is, flying) *alkali,* because it will all evaporate away. In contradistinction the original alkalies (mild or caustic) are termed *fixed.* The oxide of calcium (which is quicklime) and those of strontium and barium are called the *alkaline earths,* and these elements the *alkaline earth metals.*

Alkali lands are soils which contain so large a proportion of soluble salts as to prevent or interfere with the growth of plants. These salts may come from underground deposits of sea salt left by the drying up of ancient seas. In a greater number of instances they have probably originated in that action of water and carbonic acid on the rocks by which the soil itself has been formed. In dry weather following rains the salts crystallize out on the surface of the soil, leaving either a white or a black deposit. *White alkali* consists mainly of sodium chloride and sodium sulphate and is often chemically neutral. *Black alkali* usually contains sodium carbonate and is really alkaline in the chemical sense of the word. The black or brown color is due to the action of the sodium carbonate on the organic matter of the soil. Black alkali is the worst kind. Plants can stand about one-fourth of one per cent of sodium chloride or one-half of one per cent of sodium sulphate, but few of them will grow in soil containing one-tenth of one per cent of sodium carbonate. Black alkali soils are benefited by the application of land plaster (gypsum, calcium sulphate), which converts the sodium carbonate into the less harmful sodium sulphate and the harmless or beneficial calcium carbonate. Too heavy irrigation brings up the soluble salts from the subsoil and so makes alkali soils worse. Sometimes it converts good soil into alkali land. Irrigation of hillsides often causes alkali trouble in the valleys, because the salts washed out of the highlands accumulate in the lowlands. The only remedy for alkali in soils is to remove the salts by drainage.

Alkali soils are common in dry climates. They occur in many places in the western part of the United States. J.F.S.

ALKALOIDS, *al′ ka loyds,* a class of chemical compounds which includes the strongest poisons and the most powerful remedies known to man. Their names usually end in *ine,* as *atropine, caffeine, cocaine, morphine, quinine* and *strychnine,* all of which are described in these volumes. An alkaloid, like an alkali, will combine with an acid to form a salt. It is, therefore, a base (which see). An alkali, however, is mineral, or inorganic, whereas an alkaloid is vegetable, or organic. An alkaloid may be defined as an organic base, but the term is usually restricted to the vegetable world, the term for animal alkaloids being *ptomaine* (which see). Most alkaloids are odorless, crystalline bodies, more soluble in alcohol than in water, but a few, such as nicotine, are liquid and mixible with water; the solids contain oxygen in addition to carbon, hydrogen and nitrogen, which are present in all forms. Nearly all alkaloids, if taken in harmful doses, injure the nervous system. They frequently cause permanent paralysis of certain nerves and may even cause death. The possible dangers from their use make it advisable never to use them except on the prescription of a physician.

Alkaloids are found in many plants, usually combined with organic acids. They often occur in the fruits and seeds, but sometimes in the roots and bark. *Opium* (which see), a product of the unripe fruit of the poppy, contains a score of different alkaloids, of which *morphine* is the most abundant; the roots of the various species of *aconite* (which see) yield a dozen or more; *coca* leaves give *cocaine* and several others; and the barks of *cinchona* plants yield a group of over thirty, among them *quinine* and *cinchonine.* Coffee berries and tea leaves contain *caffeine,* cacao (cocoa) beans *theobromine,* and tobacco leaves *nicotine.* J.F.S.

ALLAH, *al′ la,* the Arabic name for the Supreme Being, corresponding to the Hebrew

God. The word has made its way through all Mohammedan countries by means of the Koran, and *Allah Akbar* (God is great) is the war-cry of the Moslems. The word was applied many centuries before Mohammed to a heathen god of the Arabs.

ALLAHABAD, *al lah hah bahd',* meaning "City of Allah," or "City of God," is an ancient city of India, seat of the government of the United Provinces of Agra and Oudh. It is one of the chief resorts of Hindu pilgrims, who come to have their sins washed away by bathing in the waters of the sacred rivers, Ganges and Jumma, at their junction. It is also the scene of a great religious festival in December and January, when the city becomes crowded with fanatics and beggars. The native town is poorly built, but contains some remarkable buildings, of which the best examples are the great mosque, or Jumma Musjid, the palace of the sultan and the great citadel of Akbar. This citadel is the center of the fort of Allahabad, one of the chief strongholds of British India. The European portion of the town is handsome and well planned.

The city is situated in the midst of an agricultural district and forms the center of a large trade, the chief products being cotton, indigo and sugar. The town dates back to the third century B.C. From 1765 to the beginning of the nineteenth century it suffered from change of rulers, but finally came under British rule in 1801. In the mutiny of 1857 it was the scene of a serious outbreak and massacre and the town, with the exception of a few monuments, was destroyed. Population in 1921, 155,970.

ALLAN, *al' len,* SIR HUGH (1810-1882), a Canadian financier and ship-owner, born in Scotland. In 1826 he went to Canada and entered the employ of the leading grain-shipping and ship-building firm in Montreal. He progressed rapidly, became a junior partner in 1835, and in 1853 established a new line of ocean steamers, still called the Allan Line. He was one of the original promoters of the Canadian Pacific Railway, but the company organized by him lost its charter as the result of charges that the charter was obtained by bribery. Sir Hugh was knighted in 1871.

His son, Sir HUGH MONTAGU ALLAN (1860-), succeeded to his large commercial and financial interests, and became active in the management of the Allan Line. He was knighted in 1904 and was created a commander of the Victorian Order in 1906.

ALLEGHANY, *al le ga' ni,* **MOUNTAINS** or **ALLEGHANIES,** the name of a range of mountains that extends across the states of Virginia, Maryland and Pennsylvania from southwest to northeast, and consists for the most part of a series of parallel ridges, wooded to the summit and with some fertile valleys between. Their mean elevation is about 2,500 feet; but in Virginia they rise to over 4,000. It is in these mountains that the great coal mines of Pennsylvania and West Virginia, also the iron mines of Pennsylvania are found. They form the richest coal mining region in the United States. The name is sometimes wrongly applied to the entire Appalachian system (see APPALACHIAN MOUNTAINS), but of it they are only a part. See, also, BLUE RIDGE; CUMBERLAND MOUNTAINS.

ALLEGHENY, *al le ga' ni,* a river about 325 miles long that has its source in northern Pennsylvania about 2000 feet above sea level. It flows through Pennsylvania into New York, and again through Pennsylvania, and at Pittsburgh meets the Monongahela to form the Ohio River. It is navigable by small boats for 200 miles above Pittsburgh. The country through which it flows is very hilly and it is joined by many tributaries, the chief being the Clarion, French Creek, and Kishiminitas. The river with these tributaries drains an area of 11,000 square miles.

ALLEGORY, *al' le goh ri,* a word which means literally, *to speak other,* or to say something else than the exact thing which is meant; thus when Jesus said to His disciples "I am the vine, ye are the branches," he was speaking allegorically. The word allegory is used to describe a form of literature in which a story is told not for its own sake but to present clearly and forcibly some abstract thought. The story should be interesting in itself, that it may hold the attention of its readers until the truth is driven home.

The very simplest allegories are the little beast fables, such as those of Aesop, which every child should know. For instance, the story of the "Fox and the Grapes" is told not just as an account of how a fox acted under certain circumstances, but to bring out the thought that people are apt to scoff at what they cannot attain. More elaborate allegories, and the most dignified ever written, are the parables of the Bible. No other language is as rich in allegories as the English, which possesses not only that most perfect specimen, Bunyan's *Pilgrim's Progress,* but Spencer's

Faerie Queene, Swift's *Tale of a Tub,* and many other examples.

ALLEN, Charles Grant Blairfindie (1848-1899), a Canadian novelist and writer on science, usually known as Grant Allen. He was born at Kingston, Ont., attended various schools in Canada, the United States and England, and was graduated from Merton College, Oxford, in 1871. He became a popular writer on scientific subjects, particularly on the theory of evolution; his books include *The Color Sense, The Evolutionist at Large, Flowers and Their Pedigrees* and *Physiological Aesthetics,* the latter possibly his best work. He also wrote about thirty novels and a series of historical guide books to European cities.

ALLEN, Ethan (1737-1789), an American soldier of Revolutionary fame, the hero of the capture of Fort Ticonderoga. He was born in Litchfield, Conn., but removed to Bennington, Vt., a few years before the outbreak of the Revolution. He first came into prominence as the leader of the "Green Mountain Boys," a band of troops organized to expel from the "New Hampshire Grants," now Vermont, a number of settlers from New York. For this act the governor of New York offered a reward of $750 for the arrest of Allen. Soon after the Battle of Lexington, Allen and his Green Mountain Boys started for Fort Ticonderoga, and on May 10, 1775, made a dramatic seizure of that stronghold, Allen ordering the British commander to surrender "in the name of the great Jehovah and the Continental Congress."

After this Allen went to Philadelphia, where he received the thanks of Congress for his services. He was sent on a secret mission to Canada to learn the views of the Canadians as to rebellion, and accompanied Montgomery's expedition. In an adventure at Montreal he was captured and sent to England, but was returned to this country, where he was confined in prison-ships. On obtaining his freedom Allen was appointed lieutenant colonel of the Vermont militia and was sent as an agent to Congress to secure the admission of Vermont to the Confederation. Congress hesitated, and the British commanders endeavored to persuade Allen to restore the authority of the Crown. He was accused of treason, but it is believed that he desired only to advance the cause of the colonies. After the Revolution Allen lived in retirement and wrote a book on natural religion, entitled *Reason the Only Oracle of Man.*

ALLEN, James Lane (1849-), an American novelist whose works show not only a most artistic style, but a deep interest and knowledge of human nature. He was born near Lexington, Ky., was graduated at Transylvania University, and after teaching at Kentucky University became a professor of Latin and higher English at Bethany College, W. Va. By 1886 he had become so well known through his contributions to magazines that he was enabled to move to New York and devote all his time to writing. Among his works are *The Choir Invisible,* a tale of Kentucky in frontier days, dealing not with adventures, however, but with the inner life of its characters; *The Reign of Law,* a story of a young man's loss of religious faith and his recovery of it through the woman he loves; *A Kentucky Cardinal,* in which the beautiful cardinal bird plays a part in the lives of two young people. *The Doctor's Christmas Eve,* and *The Heroine in Bronze, The White Cowl* and *Sister Dolorosa* are perhaps his best short stories.

JAMES LANE ALLEN

ALLENTOWN, Pa., an industrial city, known for its manufacture of silk and furniture. It is the county seat of Lehigh County, and is situated in the eastern part of the state about midway between the northern and southern state lines, and on the Lehigh River and Lehigh Canal. Philadelphia is fifty-six miles southeast, Easton is eighteen miles east and north, and New York City is ninety-two miles northeast. The city is served by the Lehigh Valley, Central Railroad of New Jersey and Philadelphia & Reading railways; three trolley lines communicate with other cities and extend as far as Philadelphia. The population, largely of German descent, increased from 51,913 in 1910 to 73,502 in 1920. The area is nearly six square miles.

Allentown is located on a plateau which slopes toward the Lehigh, Little Lehigh and Jordan rivers. Beside City Park, Dorney Park and Center Square, which has a soldiers' and a sailors' monument, there are nine well-equipped

playgrounds. Paterson, N. J., is the only city of the United States that excels Allentown in the manufacture of silks, 10,000 people being employed in its twenty-three silk mills. It is one of the largest furniture-producing cities in the United States, and it also manufactures iron, steel, cement and cigars. A mammoth steel plant, located a half hour's ride from the city, employs about 1,200 skilled mechanics, and the thirty-four cement mills of the Lehigh district employ 12,000 men and produce about one-third of the total product of the United States.

A $1,000,000 courthouse was built without bond issue or increase of taxes; the hospital for the insane, the prison and other public buildings are constructed of limestone found in the vicinity. Besides these its city has a $500,000 high school building, a public library, Muhlenberg College (Lutheran), and Allentown College, for women.

The first settlement was named in honor of William Allen, then Chief Justice of Pennsylvania, who founded the town in 1752. It became the county seat of Lehigh County in 1811, when it was incorporated as Northampton Borough. Here in 1799, John Fries of "Fries Rebellion" fame, aroused the German opposition to the window tax, a tax formerly imposed in Great Britain on all windows in houses, above a certain number. In 1838 the original name was restored, and Allentown was incorporated by special charter. The commission form of government was adopted in 1913. Allentown owns and operates its water works.

ALL-FOOLS' DAY, the name given to the first of April, a day quite generally devoted to playing absurd but harmless jokes. Its origin, though unknown, is not recent, as an old English almanac printed in 1760 contains the following rhyme:

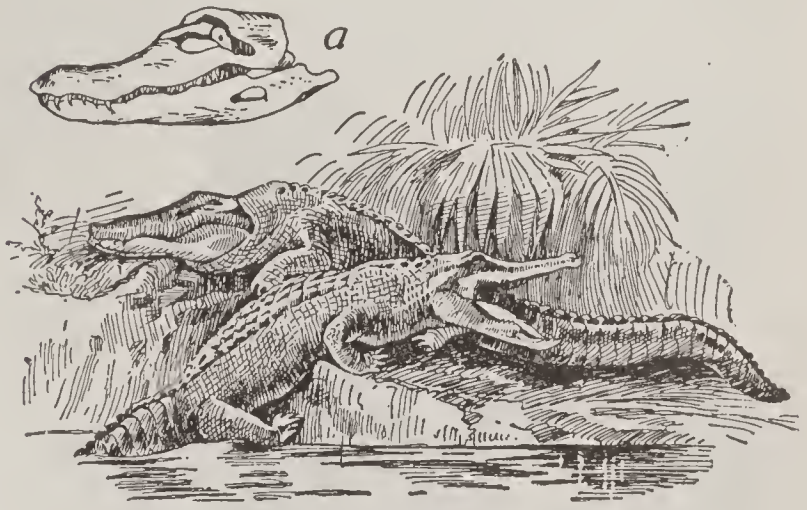
> The first of April, some do say
> Is set apart for All-Fools' Day.

In English-speaking countries the victim of a joke is called an April *fool;* in France, an April *fish;* in Scotland he is a *gowk.* See APRIL, for panel-shaped illustration.

ALLIANCE, *al li' ans,* OHIO, an industrial city in Stark County, in the northeastern section of the state, and on the Mahoning River. Canton is nineteen miles southwest, Cleveland is fifty-five miles northwest, and Pittsburgh is eighty-three miles southeast. The New York Central Lines and the Pennsylvania Company provide railway transportation, and electric lines extend north, east and south from the city. The first settlement, in 1838, was called Freedom, the name being changed to its present one in 1851; the village was incorporated in 1854, and the city was chartered in 1889. Americans comprise seventy-five per cent of the population, which increased from 15,083 in 1910 to 21,603 in 1920. The city's area is a little less than four square miles.

Industrially Alliance is largely engaged in engraving and in making account registers. About 2,000 people are employed in its leading engraving establishment, and almost as many are occupied in making registers. There are steel works, manufactories of agricultural implements and heavy machinery and large machine shops. Pottery is an extensive product of the vicinity. The city has two parks, a $100,000 city hall, the Glen-Morgan building which cost $300,000, a Carnegie Library, and Mount Union College (Methodist Episcopal), founded in 1846.

ALLIGATOR, *al' li gay tur,* a large reptile resembling the crocodile, from which, however, it differs in having a shorter and flatter head, and feet less fully webbed. A few alligators are to be found in China, but for the most part they dwell in and about the waters of tropical America, where they may be seen during the day basking on the ground in the heat of the sun or floating near the surface of fresh-water streams. Formerly they were very common along the shores of the United States from North Carolina southward, and far up the Mississippi River, but now they are not often seen north of Florida. Millions have been killed for sport and because of their hide, which makes a valuable leather, so there is danger of their being exterminated, unless protective measures are undertaken. There is one very successful alligator farm in Florida, where the animals are reared for profit.



ALLIGATORS

(*a*) represents the bony structure of the head.

Alligators are very slow in growth, and when fifteen years of age are not more than two feet long, while nearly a hundred years are required for them to reach their full length of sixteen feet. They are active animals and prey upon whatever game comes their way, taking their food into the water below the surface and eating it. In spite of their size they are rather timid, but defend themselves viciously if attacked; on shore they rush with open mouth at their enemies and thrash their powerful tails from side to side. The young are hatched by the sun from eggs, of which the female lays 200 or more in great heaps of vegetable matter, each one slightly larger than a hen's egg.

During the winter months the alligator remains under ground, in a torpid condition, and while in this state is often dug out and killed. This is not the only way in which alligators are killed, however. They are angled for like fish, with hook and line, dragged ashore and then shot. See CROCODILE.

ALLIGATOR PEAR or **AVOCADO,** *av oh kay' doh,* an egg-shaped fruit, weighing from one to two pounds, borne by an evergreen tropical tree. When ripe it is usually dark green in color on the outside, and contains a large round kernel embedded in the flesh, which is light green and of the consistency of firm butter. It is highly prized for its delicate flavor and may be eaten with sugar and cream or a sprinkling of salt and pepper. Alligator pear salad is considered a luxury, and in the southern states of the American Union the fruit is used for flavoring soups. Its food value is greater than that of most fruits, as it contains, on an average, ten per cent of fat.

ALLIGATOR PEAR
The illustration shows the whole fruit and foliage, also the fruit halved.

In most tropical countries it is found growing wild; in California, Florida and Hawaii it is extensively cultivated. In most large cities of the United States it is sold at prices ranging from forty to seventy-five cents each. It is sometimes called vegetable butter, and is known as "midshipman's butter" among sailors.

AL'LISON, WILLIAM BOYD (1829-1908), an American statesman, for thirty-five years United States senator from Iowa. For twenty-five years before his death he was chairman of the important committee on appropriations, and during his long service practically every financial measure passed by Congress was at least partly his work. He was joint author of the Bland-Allison bill of 1878, which provided for the purchase of silver bullion and the coinage of a certain number of silver dollars each month. He took a prominent part in the discussion and amendment of the so-called railroad rate bill in 1906. He was several times a prominent candidate for the Republican nomination for President, and was always one of the party's leaders.

Allison was born at Perry, Ohio, was educated at Allegheny College, Pa., and Western Reserve College, Ohio, and practised law in Ohio until 1857, when he removed to Dubuque, Iowa. He served in the Federal House of Representatives as a Republican, from 1863 to 1871, and in 1873 was elected to the United States Senate, being five times reëlected. A month before his death he was renominated for a seventh term.

ALLITERATION, *al lit ur a' shun,* the use of the same or similar letters or sounds at the beginning of two or more closely succeeding words or syllables, as *"purged* of *pride"; "*a *damsel* with a *dulcimer"; "*the *cloth* that *cloaks* the *clay."* Early poetry, whether English, German or Norse, had no rhyme, and alliteration was essential, and was arranged according to a certain definite scheme. To-day, though no longer looked upon as necessary, it is often employed to add beauty or to bring out certain effects. Thus Keats conveys perfectly the impression of gentle waters against the bank when he says, "I hear *lake* water *lapping* with *low* sounds on the shore." Coleridge, Tenny-

son, Swinburne and Kipling are among the modern poets who have used alliteration most aptly, Swinburne especially depending on it for many of his beautiful effects.

ALLOPATHY, *al lop' a thi,* a word originating with Dr. Samuel Hahnemann and applied by him to the old or "regular" school of medicine, to distinguish it from his system of homeopathy, introduced about 1800. *Allopathy* is derived from two Greek words meaning *other* and *disease.* See HOMEOPATHY.

ALLOTROPY, *a lot' roh pi,* in chemistry, is the existence of an element in several forms, which are physically different, as in hardness, smell, transparency, but are chemically the same. The word is of Greek origin, and is derived from *allos,* meaning *other,* and *tropos,* meaning *turn,* or *way.* The best example, probably, is carbon, which exists in three pure forms, as charcoal, graphite and diamond. Coal is not pure carbon, ranging from about fifty to eighty-five per cent. Another good example is oxygen, which is ordinarily odorless; but if a silent electrical discharge takes place the oxygen turns to ozone, which has, among other characteristics, a disagreeable odor. A third element which shows marked changes is phosphorus. In its ordinary, pure form, phosphorus is a pale yellow, crystalline solid, much like wax in its consistency. It burns readily, sometimes spontaneously, has a strong odor, and is very poisonous. When heated for a short time at a temperature of 450° F. it turns into an odorless, brownish-red powder which is not poisonous. It exists in several other *allotropic* varieties, which are discussed in the article PHOSPHORUS.

ALLOY, *al loi'.* If the wedding rings and brooches which are sold in the stores as "solid gold" were really made of the pure metal they would not wear well and would not long retain their shape, for pure gold is too soft to be serviceable for most purposes. Few metals, indeed, are fit to be used in a pure state, and most of the innumerable metallic objects which are in constant use are composed of mixtures of various metals. These compounds are called *alloys.* Such compounds are formed by melting together two or more metals, the object being to obtain certain qualities not to be found in any of the metals singly.

Various changes are produced in the properties of metals by combining them with others. In general, the resulting mixture, or alloy, is made harder, and becomes less capable of being hammered into sheets or drawn out into wires. The weight of an alloy, strange as that may seem, is sometimes less than the average weights of the metals of which it is composed. Then too, an alloy is always more fusible than the metal most difficult to melt that enters into its makeup, and generally even more so than the most easily melted one.

It is hard to overestimate the importance of alloys. Steel, bronze, brass, German silver, pewter and solders are all alloys and of each of these there are numerous varieties, formed by different combinations of the metals, each specially adapted to some certain purposes. The gold of which coins are made is 900 parts out of 1,000 pure gold, while the other 100 parts are an alloy of silver and copper in the proportion of 1 to 3. Silver for coins is 900 parts pure, the alloy in this case being copper. When gold is used in jewelery it is measured in *carats* (which see), 24 carat being pure gold. Thus 20-carat gold is an alloy of twenty parts gold to four parts of some other metal or metals, usually silver and copper. Although articles made of 10-carat gold will hold their color and not discolor, comparatively little jewelry is now made of less than 14-carat gold.

ALL-SAINTS' DAY, a Christian festival first celebrated by Pope Boniface IV in 835, when the Roman Pantheon was dedicated as a Christian temple. It is observed on November 1 and is designed to commemorate all the saints, thus honoring those not more signally remembered by days named solely for them.

ALL-SOULS' DAY, a Roman Catholic festival set apart for the relief of the souls in purgatory by means of prayers and the celebration of the mass. It was founded in the eleventh century and is observed on November 2. In certain Catholic countries, lighted candles are placed on the graves of the faithful and kept burning throughout the day.

ALLSPICE, *awl' spice,* a useful spice which receives its name from the fact that its flavor suggests those of cinnamon, nutmegs and cloves, mixed together. Allspice is the dried berry of a tree of the West Indies, belonging to the myrtle group, and known as the *pimento.* The fruit is also called *Jamaica pepper* because the tree flourishes abundantly on the island of Jamaica. Allspice is employed chiefly as a spice for seasoning food. The oil of the berries is sometimes used in medicine and in perfuming soaps. The toilet article, *bay rum,* obtains its characteristic odor from the oil of the berries of an allied species, known as the *bayberry* tree.

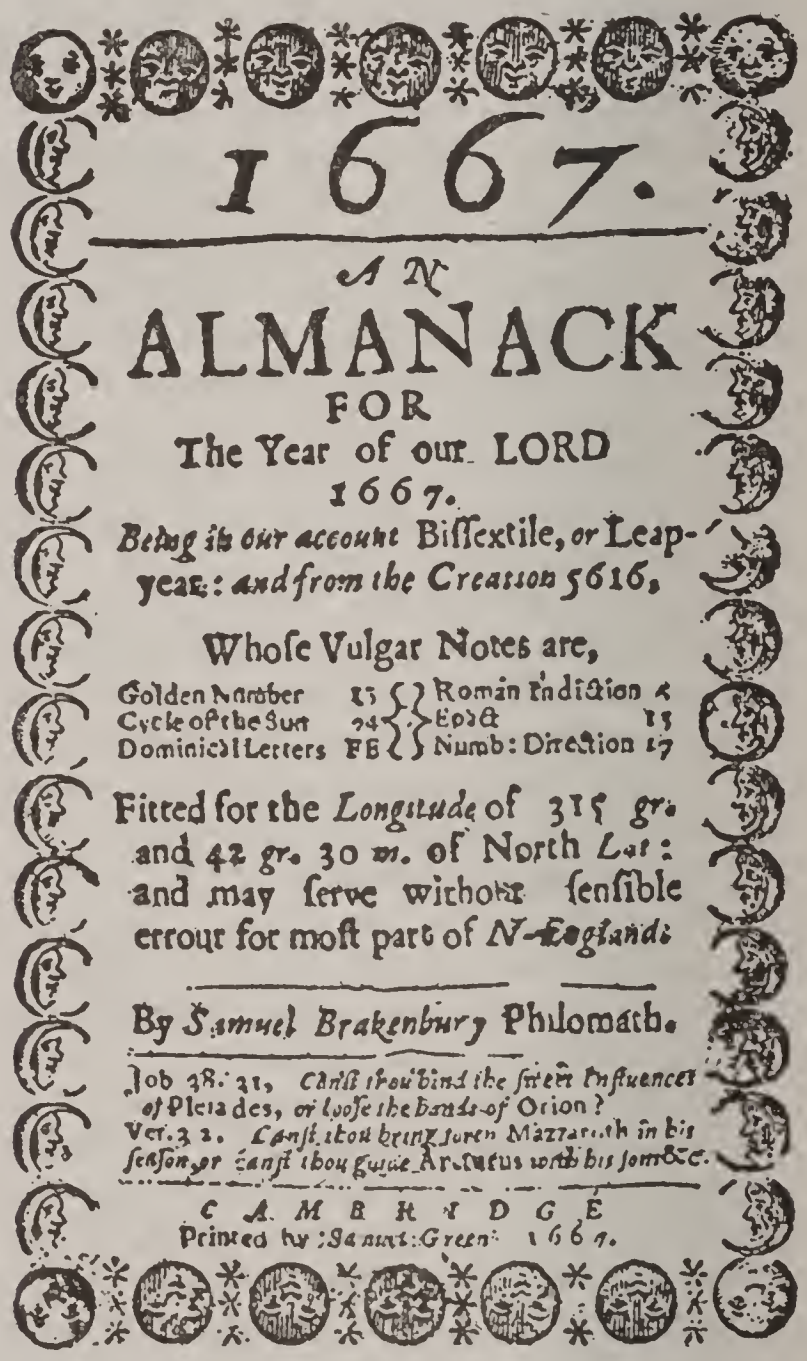
ALLSTON, *awl' stun,* WASHINGTON (1779-1843), an American painter whose characteristic use of rich, glowing color has given him the name "the American Titian." He was born at Waccamaw, S. C., studied art in New England schools and was graduated at Harvard in 1800. While abroad he attended the Royal Academy of London, and also made a special study of the master artists of the Venetian School. An early painting, *The Dead Man Revived,* is in the Pennsylvania Academy of Fine Arts. Other works include *Uriel in the Sun, The Prophet Jeremiah* and *Belshazzar's Feast.*

ALLUVIUM, *al lu' vi um.* Water is one of the chief agents which slowly but continuously modify and change the surface of our earth. The materials produced by the action of water, known as erosion (which see), are collected by the rivers and deposited along their lower course. These deposits are known as alluvium or alluvial deposits. They consist of sand, mud, gravel, clay, boulders and so on, and are deposited either at the bottom of the rivers, or along their banks or at their mouth, where they form what is known as deltas. The large tracts of fertile land found in the valleys and along the banks of many rivers have been formed by alluvial deposits left there by the river in the course of many centuries. Gold found in the soil on the banks and in the bed of streams is spoken of as alluvial gold, that is, gold found in alluvium. See DELTA; FLOOD PLAIN; RIVER.

ALMA MATER, *al' ma may' tur,* a Latin phrase meaning *fostering mother,* affectionately applied by the graduates of a school or college to the institutions in which they have been educated. Thus a graduate will speak of Harvard, Michigan, McGill, Cambridge, or other college or university as his *alma mater.* In England the term is applied rather to one of the great public schools than to a university, so that Eton is more frequently referred to as *alma mater* than is Oxford. The term was originally applied by the Romans to Ceres, the goddess of agriculture, but it has been used in its present figurative meaning for many years.

ALMANAC, *awl' ma nak,* a book or pamphlet which contains a calendar and a variety of information. It usually gives interesting facts about the planets and the stars, the dates of the phases of the moon, and the time of eclipses and other phenomena. Holidays and feast days are given, as well as birthdays of great men, dates of important battles, and many items of current interest, often including summaries of recent events in political history and statistics of area, population, agriculture, manufactures, mining and other industries.

In addition to these general almanacs there are many whose field is limited to special subjects, such as navigation and astronomy. One


1667.

AN
ALMANACK
FOR
The Year of our LORD
1667.
Being in our account Bissextile, or Leap-year: and from the Creation 5616.

Whose Vulgar Notes are,

Golden Number 13 } Roman Indition 4
Cycle of the Sun 24 } Epact 13
Dominical Letters FE } Numb: Direction 17

Fitted for the *Longitude* of 315 gr. and 42 gr. 30 m. of North *Lat:* and may serve without sensible errour for most part of *N-England.*

By *Samuel Brakenbury* Philomath.

Job 38. 31, Canst thou bind the sweet influences of Pleiades, or loose the bands of Orion?
Ver. 32. Canst thou bring forth Mazzaroth in his season, or canst thou guide Arcturus with his sonnes &c.

CAMBRIDGE
Printed by Samuel Green 1667.

ONE OF AMERICA'S EARLIEST ALMANACS
Only two copies of the 1667 Almanac are known to exist. One is in the library of the American Antiquarian Society, Worcester, Mass., purchased for $275. The other is in the hands of a private collector in Albany, N. Y. The illustration shows the title page.

of the most famous of these is the *Almanach de Gotha* (that is, Almanac of Gotha), so called because it is published in the German city of Gotha. It includes much statistical matter for all countries, but is best known for its genealogies of royal and noble families. It is edited with extreme care, and only those persons are listed whose right to a title is beyond dispute.

Almanacs were in use among the Romans in ancient times, but the oldest existing manuscript copies date from the fourteenth and

fifteenth centuries. Formerly their immense popularity was due to the mass of astrological prediction with which they were filled, and the effect of these guesses at the future was often so bad that it was frequently necessary to prohibit the publication of prophetic almanacs. In 1828 the Society for the Diffusion of Useful Knowledge, by publishing the *British Almanac,* took the lead in the production of an almanac containing genuine information, and by contrast showed the fraudulent nature of the information which had been furnished in the earlier almanacs. Even to the present day there are published almanacs containing astrological predictions, but they are not taken seriously. There are also many almanacs the sole purpose of which is to advertise patent medicines.

The most famous of the popular almanacs which have been published in the United States was *Poor Richard's Almanac,* begun by Franklin in 1732 and continued for twenty-five years (see POOR RICHARD'S ALMANAC). The publication of good almanacs in America is now generally the work of religious denominations, newspapers, trades, and professions. The *Nautical Almanac and Astronomical Ephemeris,* published annually by the United States Navy Department, contains the information necessary for determining at any time the absolute and relative places of the sun, moon and planets and of many of the fixed stars, also several different series of phenomena for the determination of longitudes and latitudes, the distances of the moon from fixed stars and from planets and the time for the occurrence of eclipses. To this are added rules and tables for practical use in nautical astronomy, land observations and tables of tides. It is a textbook for the navigator, and no sailor leaves the American shore without it. The computations are made three years in advance and could be made still farther if necessary, but no cruise is made which lasts longer than that time. Similar publications are issued by the governments of Great Britain, France, Germany and other countries. W.F.Z.

ALMANDINE, *al' mon din,* or **ALMANDITE,** names given to two kinds of comparatively inexpensive precious stones of great beauty, one a variety of garnet, red in color and transparent, the other belonging to the ruby species, and having a rich violet color. The red variety is found chiefly in Alabanda, Asia Minor, hence its name. It is highly valued as a setting for gems, and when cut with a convex face is known as a *carbuncle.* The violet almandine is found in Ceylon, Australia, Alaska, New York and less plentifully in other parts of the United States.

ALMA-TADEMA, *ahl' ma tad' e ma,* LAWRENCE (1836-1912), a Dutch painter whose pictures of ancient Egyptian, Greek and Roman life are remarkable for the correctness with which they record the costumes and the spirit of the past. No other artist has so wonderfully reconstructed on canvas the life of ancient nations, and refurnished the homes of 2000 years ago and peopled them with figures that live. He was born in Friesland, but lived after 1870 in England, where in 1879 he became a member of the Royal Academy. Some of his best-known pictures are *A Reading from Homer,* a pen-drawing of which will be found with the article *Homer* in these volumes; *The Four Seasons, Antony and Cleopatra* and *At the Shrine of Venus,* the last-named of which was exhibited at the exposition in Saint Louis in 1904.

ALMERIA, *al may re' ah,* capital of the province of the same name, a seaport of Southern Spain, sixty miles southeast of Granada. It is chiefly noted for its excellent harbor and for the export of vast quantities of fine-flavored white grapes. The most important building is the Gothic cathedral, dating from 1524, built to resemble a fortress with battlements. The city's commerce is very extensive, the principal exports, next to grapes, being wine, almonds, pomegranates, and other fruits, sugar, macaroni and iron ore. Almeria was the foremost seaport of Granada during its occupation by the Moors and was not captured by the Spaniards until 1489. Population in 1914, 45,198.

ALMOND, *ah' mund,* the fruit of the almond tree, is a plant belonging to the rose family, and related to the peach and nectarine. The almond tree is a native of Asia and Africa, and was a common fruit in Bible lands, but is now also grown abundantly in Southern Europe along the Mediterranean Sea, and is cultivated in England for

ALMOND
Branch, with flowers. (*a*) fruit; (*b*) cross-section of fruit.

its beauty and in California for its fruit. It reaches a height of twenty feet, and bears beautiful pink or white flowers that appear before the leaves, which are oval, pointed and notched on the edge. The fruit has a downy outer coat enclosing a hard, wrinkled shell, within which is the kernel, or seed.

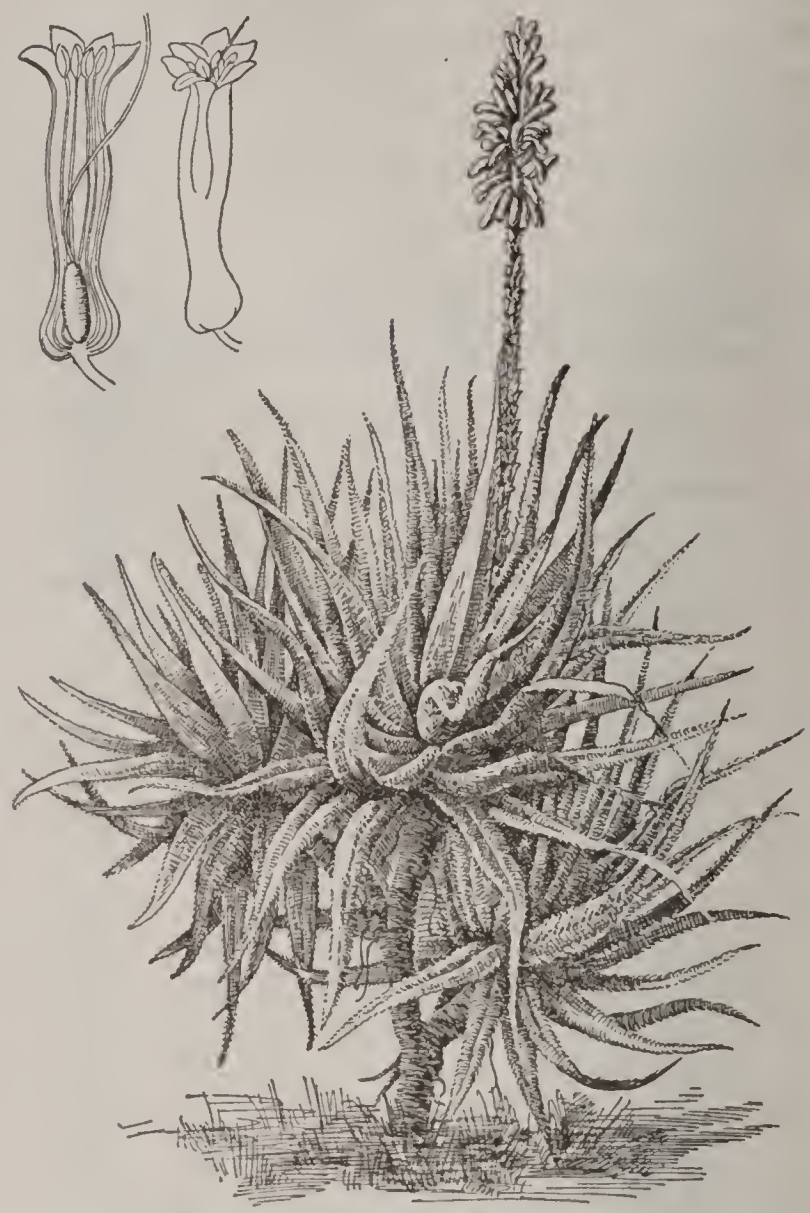
There are two varieties of fruit, the sweet and the bitter. Sweet almonds are widely used for food, and are nutritious, as they contain over thirty per cent of fat. They are eaten either raw or cooked, and are also used in cakes and candies. Sugared almonds and salted almonds are popular delicacies. The kernel of both varieties contains an oil that is used in medicine and as a perfume. Bitter almonds, through chemical processes, yield the poisonous substance, *prussic acid.* Almond butter, a compound of bitter almonds, rosewater, white of egg and alcohol, is a toilet article.

ALMONTE, *al mon' te,* ONT., a town in Lanark County, on the Canadian Pacific Railway, thirty miles southwest of Ottawa. It is important chiefly as a marketing and distributing point for the surrounding farm region, but also has woolen and knitting mills, a soap factory and stove and iron works. Almonte was settled in 1830, and was incorporated as a town in 1881. Population in 1921, 2,504.

ALOE, *al' o.* Though these tropical plants belong to the lily family, they bear little resemblance to any of the lilies. In height they range from a few inches to thirty feet or more, but despite these differences in size they have certain well-marked characteristics which prove their close relation. Their leaves are fleshy, thick and lance-shaped, and generally bear sharp spines at the point and along the edges. Usually these appear to grow directly from the ground, but sometimes they are borne on a visible stem. The flower stalk shoots up from the center, and bears at its end a dense cluster of yellow or reddish flowers, which are rather tube-like in form.

In the African countries where the aloe is most plentiful, cordage, fishing-nets, lines and coarse cloth are made from its fibre, and from its fleshy leaves is distilled the bitter *aloes* which is of much importance in medicine. From the leaves of certain species, too, a beautiful violet color is obtained. The American aloe or agave is an entirely different plant, known as the century plant (which see).

Aloes in Medicine. This intensely bitter drug, which is obtained by evaporating the juice from the leaves of various aloe plants, has been known since the beginning of the Christian Era, at least. Aloes act upon the liver and the intestines, and are the most important of the vegetable purgatives.



ALOE
Small inserts show details of flower head.

ALPACA, *al pak' a,* a South American animal belonging to the same family as the camel, and of special value to man because of its thick growth of fine wool. The alpaca is reared only on the high plateaus of the Andes Mountains, and thrives especially well on the heights of Chile and Peru. It resembles both the llama and the sheep in appearance, but is between them in size, and has a longer neck than the sheep. Like them, it is a cud-chewing animal. Its wool is finer than that of the llama and straighter than that of the sheep. Its color varies from grayish-white to almost black.

The alpaca is shorn every year, when the silky wool has grown to be eight inches in length, and millions of pounds of wool are shipped to Europe and America. The strong, soft, elastic fiber is woven into beautiful fabrics, which, under the name alpaca, are made into shawls, clothing for warm weather, coat-linings and umbrella covers. A fabric of cotton and wool, containing very little alpaca

wool, and used for women's dresses, is now widely sold under the name *alpaca*. The flesh

ALPACA

of the animal has a pleasing taste and is a wholesome food.

ALPENA, *al pe' na,* MICH., the county seat of Alpena County, in the northeastern part of the state, is situated on both banks of Thunder Bay River and on Thunder Bay, a small arm of Lake Huron. Bay City is 124 miles south, and Saginaw is 152 miles, also south. The population in 1910 was 10,763; in 1920 it was 11,101. The area is seven square miles.

Alpena has an excellent harbor, which has been improved by the Federal government. The surrounding counties, abounding in small lakes, are an agricultural and timber section. Near the city are quantities of limestone, clay and shale. These and the timber supply raw material for two of the largest manufacturing industries, paper (wood pulp) mills and the cement works. Besides these there are tanneries, extract works (hemlock), foundries and machine shops, woolen mills, sawmills and excelsior mills. Alpena is served by the Detroit & Mackinaw railroad, and there are steamship lines to Detroit.

The city and vicinity are favorite summer resorts. In the many small lakes are quantities of speckled trout, black bass and perch. In some parts partridge, duck, deer and fox are abundant. The city has four parks and among the public buildings are the Federal building, in front of which stands a cannon from the battleship *Maine,* the city hall, a library and a hospital.

The site occupied by Alpena is an old Indian burying ground. In 1835 a trading post was established, and a permanent settlement was made in 1858. A city charter was obtained in 1871. The commission form of government was adopted in 1916. H.M.H.

ALPHA, *al' fah,* **AND OMEGA,** *o me' ga,* an expression often used to convey the idea of completeness, for the two words are the first and last letters of the Greek alphabet. They are used as a symbol of God in *Revelations* I, 8; "I am Alpha and Omega . . which is, and which was and which is to come." At one time the letters were emblematic of Christianity, being engraved on the tombs of the early Christians.

In astronomy Alpha is applied to the chief star of a constellation, and the word has a similar use in other sciences.

ALPHABET, *al' fa bet.* When this word is used to designate the series of characters used in writing a language it means exactly what the child's "A-B-C" means, for *Alpha* and *Beta* are the first two letters of the Greek alphabet. As long as civilization was on a low plane and people had little communication with each other except by word of mouth, such a thing as an alphabet was unthought of. Gradually, however, the necessity arose of being able to send word to people at a distance or to record certain events, and a rude form of picture-writing came into existence. This represented words or ideas, however, and not sounds, as does the true alphabet. For instance, if a man in one village wished to send word to a man in another village that he had been attacked by a number of enemies, he might draw a rough picture of a man at a tent door—himself—being made the target of the numerous spears of other crudely drawn men. Kipling in his *Just-So Stories* has two very interesting fanciful tales called *The First Letter* and *The Making of the Alphabet* which show the possible origin of such communication.

But such picture-writing was always likely to be misunderstood, and it gradually became clear that characters representing sounds would furnish the only sure means of communication. So far as is known, the Phoenicians were the first to invent an alphabet, in this true sense of the term, though it is possible that they received suggestions from the cuneiform writing of the Babylonians or the hieroglyphics of the Egyptians. At any rate, the Greeks, when they came into contact with the Phoenicians, found the latter to possess the very useful art of writing with an alphabet, and that art they

promptly borrowed. Either directly or through the Latin all the alphabets of modern times are derived from the Greek, which was an improvement upon the Phoenician in that it had letters to represent vowel sounds instead of the dots of which the older language made use.

Just how the earliest alphabet was made up is by no means certain, though it seems probable that in part at least it was an outgrowth of the older picture-writing; that is, each letter was probably drawn at first to represent some object, the name of which began with the sound which the letter was to represent. Thus the *B,* which in Greek was *beta,* in Phoenician *beth,* undoubtedly represented a house, for *beth* was the Phoenician for *house.* Originally it was drawn in some resemblance to the end of a house (see *B*), but as it was written more rapidly and more frequently its form changed until it became the capital *B* of to-day.

The perfect alphabet has not been invented; if it ever appears it will be found to have just as many letters as the language has sounds. The Spanish language is the most nearly phonetic of any modern tongue. The English alphabet is imperfect, since, in the first place, it has not a character for every sound, and, in the second place, it has letters which are superfluous, because there are other letters which represent the same sounds. Thus *c* may stand for any one of eight sounds, while *c* is unnecessary because its two sounds are represented by *k* and *s*.

An alphabet is not absolutely necessary to the writing of a language, since what is called a *syllabary* is a possible substitute. That is, every syllable, instead of every sound, has its special character, as in Chinese. It is a much more difficult method of writing, however, for the Chinese child must learn thousands of symbols instead of the twenty-six which suffice for the English child. See CUNEIFORM INSCRIPTIONS; PHOENICIA. A.MC C.

Consult Skinner's *The Story of the Letters and the Figures,* written particularly for boys and girls.

ALPS, the greatest mountain system and the most important and magnificent physical feature of Europe. Once the Alps marked the northern limit of the civilized world, but even before the Christian Era the Romans knew the way through eight or ten of its passes. Across these passes the Roman legions poured into Gaul, which eventually became a great Roman province. Back over these same passes came foreign invaders, first Hannibal, with his Carthaginians, a few centuries later the Goths, then the armies of Charlemagne and the Holy Roman Emperors, and finally Napoleon, who built a wonderful road from France into Italy for his invading hosts.

Except for the few passes known to the Romans, there was little exploration of the mountains until comparatively recent times. The Mont Cenis, from 1400 until the time of Napoleon the most traveled pass, was unknown until the eighth century, and the Saint Gothard and the Simplon were first used in the middle of the thirteenth century. Yet in the heart of these mountains flourished an independent nation, the Swiss Confederation. Here, too, and in the foot hills, several great families first became powerful—the Houses of Savoy, Hapsburg and Hohenzollern, later the royal family of Italy and the imperial families of Austria and Germany.

No other mountain system in the world has now been so thoroughly explored, even to the summits of its highest peaks. Not only has man made paths for himself, but he has built excellent roads, many of which would be a credit to a great city. He has built railroads, so that to-day the roar of the train echoes in the passes which once heard the shouts of the Roman legions. Great tunnels, the Simplon, the Saint Gothard, the Mont Cenis and the Arlberg carry the rails below the crest of the range. A railroad even runs inside a great mountain, the Jungfrau, almost to its summit. Every point of scenic or historic interest now has its inns and hotels, and the pedestrian with a knapsack on his back is cared for in countless châlets.

At all seasons the Alps are now a great playground, in which nature has done its best to present a beautiful picture on every hand, and the Swiss people have provided for the comfort of visitors who come to appreciate. Nowhere else in the world are more magnificent contrasts in scenery. Standing on the shores of a little lake, surrounded by pretty Swiss châlets and farms, the visitor may gaze upward 10,000 or 12,000 feet to the snowy summit of the Jungfrau or Mont Blanc. From the summit of such a peak, or even from many lower points, there is an endless vista of mountains, with here and there a green field or a brown village; men and their homes seem minute specks, clinging to the sides of rocky precipices or huddled in narrow valleys.

Of the entire 90,000 square miles covered by

the Alps (an area larger than Ohio and Pennsylvania), one-fourth is barren—rock, ice, snow and water; another fourth is available for farms and vineyards; and a half is pasture land and forest. In the summer the herds roam high on the mountain-side, and they are often seen only a few hundred feet from the snowy source of some stream. In the lower regions the plant and animal life is not different from that of the rest of Europe, but above the timber-line there are a few animals and plants which belong distinctively to the Alps. There are the chamois and the steinbock, or mountain goat, who haunt the inaccessible rocks of the higher altitudes, and there is the famous flower, the *edelweiss* (which see). There are also the Alpine rose and violet, known the world over, and no nature-lover can escape a thrill when he first sees a snow-field dotted with the little patches of color which testify to the hardy character of these flowers.

Detailed Location. The Alps form a somewhat irregular crescent in Southern Europe, with its horns near Nice, on the Mediterranean, and Trieste, on the Adriatic. The mountains almost reach to the seashore at both ends, thus shutting off Italy from the rest of Europe. They cover a total area of 90,000 square miles, including almost the whole of Switzerland and parts of Northern Italy, Southeastern France, Southern Germany and Western Austria. The Alps have a length of 700 miles in a general east-and-west direction, and a width of 100 to 180 miles. From the principal chains spurs extend to the Apennines, the Vosges, the Harz and the Carpathians. Most of the so-called Alpine region has an average altitude of 6,000 to 8,000 feet, but there are hundreds of peaks exceeding 10,000 feet. Mont Blanc, the loftiest, Monte Rosa, the second highest, the Matterhorn, another giant, and the Jungfrau, perhaps the most beautiful of them all, are described in separate articles. The summits of these peaks and many others are covered with an everlasting mantle of snow and ice. From them there descends to the valleys below great glaciers, enormous masses of partly-melted snow and crushed ice, which acquire a force that nothing can resist (see AVALANCHE). The *Mer de Glace,* on the northern slope of Mont Blanc, is fifteen miles long and three miles wide, and the *Aletsch* glacier, the largest in the Alps, is sixteen miles long. The Rhone glacier, the source of the river Rhone, is one of the most famous.

Several of the great European rivers rise in the Alps, including the Drave, the Po, the Rhine and the Rhone (all of which see). The important lakes in or near the Alps are also described in these volumes; these are Como, Constance, Garda, Geneva, Lugano, Maggiore, Neuchâtel and Zurich. W.F.Z.

Outline on the Alps

1. Size
   - (a) Area, 90,000 square miles
   - (b) Length, 700 miles from east to west
   - (c) Breadth, 100 to 180 miles
   - (d) Average altitude, 6,000 to 8,000 feet
   - (e) Loftiest peaks
2. Location
   - (a) Occupying Switzerland and part of Italy, France, Germany and Austria
3. Physical features and scenery
   - (a) Precipices
   - (b) Glaciers
   - (c) Farms and châlets
   - (d) Lakes and rivers
   - (e) Plant and animal life
4. Exploration and improvements
   - (a) Thoroughly explored
   - (b) Hotels and railroads
5. Historic interest
   - (a) Early boundary of the civilized world
   - (b) Crossed by invaders and conquerors
   - (c) Rise of two imperial houses of Europe in small Alpine kingdoms

Consult Bowney's *The Building of the Alps;* Coolidge's *Alps and Nature in History.*

ALSACE-LORRAINE, *al sahs' - lo rane',* a former territory of the German Empire, for nearly fifty years a joint possession of all the German states. It was under the direct jurisdiction of the imperial government, and the provincial administrator, or *statthalter,* was appointed by the emperor. Its position was like that of a territory in the United States. In 1918 it was returned to France, to the unspeakable delight of the nation, as one of the fruits to that country of the War of the Nations.

Historic Importance. In France, after 1871, Alsace and Lorraine were called "the lost provinces"; for in that year, at the end of the Franco-German War (which see), the German-speaking portion of Lorraine and all of Alsace were ceded by France to the new German Empire. This was not the first time that this region had changed owners. It was originally the home of Celtic tribes, but in the fourth and fifth centuries was overrun by the Teutonic tribes, who laid the foundations for the empire of Charlemagne. When Charlemagne's empire was divided among his grandsons, it became a part of Germany, and so it remained until the sixteenth century. In 1552 Henry II of France took Metz, Toul and Verdun, and in 1648, by the Peace of Westphalia, the Holy

Roman emperors ceded more lands in Alsace to France. Louis XIV, however, was not satisfied, and in 1680 and 1681, in times of peace, he seized the imperial free cities of Strassburg and Colmar.

For a century the inhabitants resisted all efforts to turn them into Frenchmen, but with the French Revolution came a great change. The Alsatians, especially, were roused to a frenzy, and no more violent advocates of "liberty, equality and fraternity" existed anywhere. So completely did Alsace then become French in spirit that in 1871 it preferred to remain so, and about 50,000 Alsatians moved across the new border into France rather than swear allegiance to the German emperor. The annexation of the provinces to Germany was insisted upon partly because the German people regarded it merely as a just restoration, and partly because the area was necessary to the protection of Germany's military frontier.

Present Conditions. As established in 1871, Alsace-Lorraine has a total area of 5,605 square miles, slightly larger than Connecticut. It occupied the extreme southwest corner of the German Empire, with the Rhine on the east,

ALSACE-LORRAINE
Small map shows size as compared to France.

France on the west, Switzerland on the south. At the narrowest point of Alsace the distance from the Rhine to the French boundary was only twenty-two miles. The province is roughly shaped like an inverted L, Lorraine being the base and Alsace the vertical arm.

Most of Alsace-Lorraine is a plain, which becomes slightly lower as it approaches the Rhine. Half of it is occupied by farms, wheat, rye, barley and oats being important crops. Grapes are also raised extensively, and the white wines of Alsace and the red wines of Lorraine are famous. The western part lies mostly in the Vosges Mountains. Here coal and salt are mined in considerable quantities, and the iron mines are the most valuable in Germany. Many of the manufactures, especially the textile industry, are still carried on in the homes of the workmen. Cotton weaving is most important, followed by woolens, silks and linens. The iron and steel industry ranks second to the textile industry. There are good highways even in the mountains; there are 1,400 miles of railway, and several of the rivers are navigable. The canal which connects the Rhone with the Rhine has a large traffic on barges. French is the language of business and industry, but German is required by law in the schools, courts and legislature. Strassburg, the capital, Colmar and Metz are the important cities.

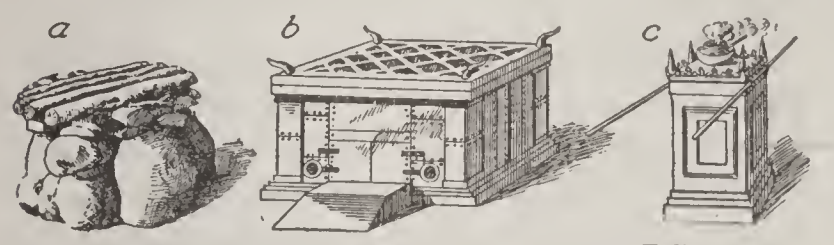
In the War of the Nations. After 1871, when Alsace-Lorraine became a part of the German Empire, there persisted a feeling, both in France and Germany, that France would some day attempt to retake "the lost provinces." This feeling was always a factor in the relations between the two nations, and was one of the causes leading to the War of the Nations in 1914. Within a week after the war began, sentimental and semi-political reasons dictated a French offensive against both provinces. From a military point of view the invasion failed, because the French were soon driven back, except in the extreme south, beyond the border, but it was successful in arousing the patriotism of the French and in stimulating their desire to reconquer the provinces. The strategy of the war, however, required the concentration of the French strength in the north of France, and after the first weeks of the war no further invasion on a large scale was attempted in Alsace or Lorraine. For further details of military operations, see WAR OF THE NATIONS. W.F.Z.

Consult Putnam's *Alsace and Lorraine.* This is an English publication (1915); all other worthy books on the subject are in German.

ALTAI, *al' ti,* **MOUNTAINS,** the name of a lofty mountain system, immensely rich in gold, silver, copper, and iron; geologically they are

among the oldest mountains in Asia. They lie partly in Russian and partly in Chinese territory, on the borders of Siberia and Mongolia. The Obi, Irtish and Yenesei rivers rise on the north side of the range. Their lower slopes are covered with verdure and the forests of the higher elevations extend nearly to the rounded summits, the highest of these being Byeluka, or White Mountain (11,000 feet). Mining is an important industry in the Russian provinces traversed by this range.

ALTAR, *awl' tur.* Taking its name from the Latin *altus,* meaning *high,* an altar as it first existed was simply a high place, such as a mound of turf, a flat-topped rock, or some other elevated object, upon which sacrifices could be performed or offerings laid. Altars have been used by nearly all races and from the earliest times, because the idea of winning the favor of the gods or of turning away their wrath by offering sacrifices and bringing gifts to the altar, has had a very important place in the religions of mankind.



FORMS OF ANCIENT ALTARS

(*a*) In the time of Abraham; (*b*) altar of burnt-offering; (*c*) altar of incense.

In the course of time altars became more elaborate. The Babylonians built them of sun-dried bricks; the Assyrians, of limestone and alabaster; the Egyptians, of richly-carved stone. The altars of the Hebrews, from the one that Noah "builded unto the Lord" after the Flood, to the magnificent gold-covered altar of incense in the Temple at Jerusalem, were a most intimate part of their worship. The altar among the Romans developed from a simple mound of earth or a heap of stone to the great Altar of Peace, built in honor of Augustus, and a masterpiece of art; both the Greeks and Romans reared magnificent altars in honor of their more important gods. The Greeks and Romans employed various shapes—round, square, oblong or many-sided.

In the Christian Era. When the early Christians began to build their churches they tried to have their altars as different as possible from those of the pagan Romans. Only one was permitted in each church, and the oblong shape was finally adopted. Beneath the altar was a small chapel used for the relics of the martyrs and saints, called the confession. It later became the crypt (see CRYPT). As early as the fifth century the altars were being adorned with precious stones, and those in the great cathedrals were often very elaborate. In the Middle Ages there came into use the altar piece, a decoration placed at the top of the altar and at the back, and these were sometimes beautified by master sculptors, painters and carvers.

At the present time the altar is quite plain in those churches which have the more simple forms of worship. In many Protestant churches there is no real altar, but the rail in front of the pulpit where the worshippers kneel to receive the sacrament of the Lord's Supper is sometimes given that name. In the Reformed Episcopal Church the communion table has taken the place of the altar. It is in the Roman Catholic and high Episcopal churches, where the more elaborate ceremonies have been retained, that the only stately and very beautiful altars of modern times may be seen.

ALTDORF, *awlt' dorf,* or **ALTORF,** a small town in the canton of Uri, Switzerland, famous as the place where, according to legend, William Tell shot the apple from his son's head (see TELL, WILLIAM). Altorf is beautifully situated above Lake Lucerne, amid vineyards, gardens and orchards, and is visited every summer by large numbers of tourists.

ALT'GELD, JOHN PETER (1847-1902), an American political leader of radical tendencies, governor of Illinois from 1893 to 1897, but above all else, a real friend of the workingman, of the immigrant, of the poor, and a leader in securing prison reform. In this position he became a national figure for his courageous, but at that time unpopular, protest to President Cleveland against the use of Federal troops during the great railway strike of 1893 and also for his pardon of the anarchists who were convicted of murder for their share in the Haymarket riot in Chicago. He was of German birth, but at the age of three was taken to the United States, where he lived on a farm in Ohio until 1863, when he enlisted in the Union army. After the war he studied law, became a leader in his profession, and was at one time a judge of the superior court in Chicago.

ALTON, *awl' tun,* ILL., an important commercial center of the state, popularly called the BLUFF CITY, on account of its beautiful location on a limestone bluff, which rises 200 feet above the Mississippi River. The city was founded in 1817 and was incorporated in 1833; its population, largely American, in-

creased from 17,528 in 1910 to 24,714 in 1920. The area is about six square miles.

Alton is situated in Madison County, about twenty-five miles north of Saint Louis and about three miles north of the confluence of the Mississippi and Missouri rivers. The distance to Chicago, directly northeast across the state is 257 miles and to Springfield, the capital, also northeast, is seventy-two miles. Excellent railway accommodations are afforded by the Chicago & Alton Railway, built to the city in 1867, the Cleveland, Cincinnati, Chicago and St. Louis, or "Big Four" route, constructed in 1879, the Chicago, Peoria and Saint Louis Railway, constructed in 1890 and the Illinois Terminal, built in 1900. Electric railways operate to adjacent towns north and south, and it is a port of call for several lines of steamers. About 3,700 people are employed in the two principal industrial establishments, the Illinois Glass Company and the Western Cartridge Company, and a large number are engaged in the manufacture of machinery, carriages, farming implements and tobacco products. Valuable limestone is found in the vicinity; this, with cement, coal, wheat and fruit comprise the principal articles shipped.

In addition to the public school system, the city has an Ursuline convent. Upper Alton, one and a half miles distant, is the seat of Shurtleff College (Baptist) for both sexes, and the Western Military Academy. Monticello Seminary, for women, is about five miles distant. The Haynes Memorial Public Library, provided by the city, the Federal Building, erected in 1911 at a cost of $75,000, Saint Joseph's Hospital, and the Cathedral of Saints Peter and Paul, are structures of interest. Rock Springs Park (eighty acres) and Riverview (eight acres) are the beauty spots of the city.

Elijah Lovejoy, first martyr to the cause of abolition, was killed by a mob at Alton, November 7, 1837, and the state has erected in the city a monument to his memory. The state penitentiary was established here in 1827 and subsequently removed to Joliet. The buildings were used as a government prison during the War of Secession.

ALTONA, *ahl' to na,* a Prussian city in the province of Schleswig-Holstein and a German commercial center of importance; it adjoins Hamburg on the south, the two being virtually one city. It carries on a very extensive commerce and since 1888, when the city joined the imperial Tollverein (German customs union), the harbor and docks have been greatly improved at a cost of $2,500,000. The name is derived from *allzu-nah,* meaning *all too near,* a term applied by the burghers of Hamburg to the only inn in the neighborhood in the middle of the sixteenth century. Altona became a Prussian city in 1866, at the time of confederation of the Germanic states. Population in 1919, 168,729

ALTOONA, *al too' na,* Pa., distinctly a railroad city, having within its limits the great shops of the Pennsylvania Railroad Company, the largest in the world. It is situated in Blair County, southwest of the geographical center of the state, 117 miles east of Pittsburgh, 132 miles northwest of Harrisburg and 237 miles northwest of Philadelphia. The city is well served by the Pennsylvania Railroad, at least fifty passenger trains being operated daily to and from the city. Electric lines extend to cities and towns north and south. In 1920 the population was 60,331, an increase of 8,204 since 1910. The area of the city is more than three square miles.

Altoona lies at the eastern base of the Alleghany Mountains, 1,180 feet above sea-level, in a district noted for its mountain scenery. Here the railroad begins to ascend the mountains to the west in a serpentine route by a grade of ninety feet to the mile, and at a distance of five miles, near the top, winds in a graceful curve around the mountains, forming the famous Horseshoe Bend. This is the highest elevation traversed by the Pennsylvania Line. North of the city is Wopsononoc Mountain, the summit of which affords a magnificent view of dale and river; and Sinking valley, to the east, abounds in wonders of nature. In this picturesque setting more than 16,000 people are employed in making and repairing locomotives, passenger coaches and freight cars. So extensive are the railroad interests in Altoona that the Pennsylvania Railroad has coöperated with the public schools to establish a railway high school, with full equipment of forge, foundry, and woodworking machinery. The city is also the business center for an agricultural region and has manufactories of silk, glass and agricultural machinery. Immense coal deposits are found in the locality and coal-mining is an important industry. Altoona has over fifty churches, two hospitals, a public library and a mechanics' library with about 40,000 volumes.

In 1849 the Pennsylvania Railroad Company selected the site of Altoona for its principal

workshops. It was incorporated as a borough in 1854, as a city in 1868, and since 1914 the government has been administered on the commission plan.

ALTO-RILIEVO, *ahl' to re lya' vo* (high relief), is the term applied to sculpture when the figures stand out more than one-half their thickness from the background without being entirely detached. On the so-called *metopes,* or slabs of marble which topped the columns of the Pantheon (which see), there are some wonderful examples of figures in high relief. The sculptures at the sides of the base of the Nelson Monument in Trafalgar Square, London, are also sculptured in this manner. See Bas-Relief; Mezzo-Rilievo.

ALTRUISM, *al' tru izm,* a word which means literally *otherism,* or thoughtfulness for others above self, and stands for the belief that the individual should subordinate his personal feelings and sacrifice himself to the welfare of society. The word was coined by the French philosopher Comte from the Latin word *alter,* meaning *other,* and the theory was worked out by him. It is the opposite of *egoism,* which makes self-benefit always the motive for conduct. Pure altruism is impossible, because everyone who has tested the theory in any degree has learned that the individual secures his own happiness in the happiness of others. The truly charitable person, who sacrifices himself that he may make others happy, attains in the end greater happiness than the selfish man, and thus to that extent may be reckoned an egoist. While there still remains an occasional philosopher who holds that self-assertion or self-development should be the main principle of life, society as a whole realizes that there can be no real progress unless each person has due regard for the interests of his fellowmen.

ALUM, *al' um,* a substance used to adulterate cheap baking powders, to harden fats and tallow, to fix colors in dyeing and also in the tanning of leather. Alum is a powerful astringent (which see) and if taken internally in large quantities seriously injures the digestive system. An ounce of alum, taken by mistake for Epsom salts, has been known to burn the throat, stomach and other organs so that death resulted in a short time. It is a disputed question, whether the quantity of alum used in making baking powders is harmful; in some of the states of the American Union its use for this purpose is forbidden. It is used in medicine as an emetic, notably in cases of lead poisoning, as a means of stopping hemorrhages, and for various other purposes.

Common alum, sometimes called *potash alum,* is the result of the decomposition of a variety of sandstone called *alum stone* or *alum shale.* If the shale is broken up by exposure to the weather, iron pyrite in the rock dissolves, and the sulphur combines with the alumina to form aluminum sulphate, which is made into alum by adding potassium sulphate. The shale may also be decomposed by roasting. Common alum is a clear, colorless solid, usually in the form of crystals; when heated it turns to a fine powder, called *burnt alum.* It dissolves readily in water, and has a peculiar puckery taste.

Most of the alum of commerce to-day is not potash alum but *ammonium alum,* ammonium being substituted for potassium. The latter is much cheaper and for most purposes is as useful, though it does not dissolve as readily in water. The ammonium sulphate is a by-product in the manufacture of illuminating gas.

ALUMINA, *a lu' mi na,* the oxide of aluminum, in its purest forms known as bauxite and corundum; its varieties include the amethyst, ruby, sapphire, topaz and emery, and in other forms it is known almost everywhere. It enters in large quantity into the composition of granite, traps, slates, schists, clays, loams and other rocks. The porcelain clays and kaolins contain about half their weight of this earth, to which they owe their most valuable properties. It has a strong affinity for coloring matters, which causes it to be employed in the preparation of the colors called lakes, used in dyeing and calico printing. See Oxide; Aluminum.

ALUMINUM, *a lu' mi num,* or **ALUMINIUM,** *al yu min' i um,* the most abundant and one of the lightest of all metals, and with the exception of silicon and oxygen the most widely distributed element in the earth's crust. It is a whitish substance, with a slightly bluish tint, a little harder than tin, which it resembles. It is about two and one-half times as heavy as water, but it is only one-third as heavy as iron, a little more than one-fourth as heavy as copper, almost exactly one-fourth as heavy as silver and one-seventh as heavy as gold. In tensile strength it excels all the other metals except iron and copper; yet it may be hammered into sheets or drawn into wires like gold or silver. It requires a heat of 1160° F. to melt it.

Its Uses. The uses of aluminum are constantly increasing. It is a good conductor of electricity, and sometimes takes the place of copper wire in the construction of electric lines. The top of the Washington Monument is covered by a thin sheet of aluminum, which is connected with a lightning rod. One of its most important uses is in the manufacture of steel; the addition of an almost imperceptible amount, say five thousandths of one per cent, eliminates air-holes, and makes the steel solid. It is also used in the manufacture of numerous household utensils, for which it is especially suited, since it is light, durable, does not rust like tinware nor chip like granite, and is not easily acted upon by vegetable acids. Hairpins, thimbles, combs, mirror frames, a substitute for tinfoil and dozens of other articles are also made from it.

There are numerous alloys of aluminum and other metals, such as aluminum bronze, an alloy with copper, and magnalium, an alloy with magnesium (see ALLOY). Aluminum gold, which is a compound of aluminum and copper, when new closely resembles real gold, and is often used in the manufacture of watch cases and cheap jewelry; it tarnishes quickly, however, and is then worthless as an ornament. Other alloys, some made by secret processes, are used in boats and automobiles and for the framework of aeroplanes and dirigible balloons.

So varied are the uses of aluminum that it seems as if man must have known of its existence for ages, yet it was unknown before the beginning of the nineteenth century, and it has not, in any part of the world, been found in a pure form. Pure aluminum was not in existence until 1854, when it was produced chemically. The metal was of no practical value until the last decade of the nineteenth century, after a new process was discovered for the reduction of aluminum by electrolysis (which see).

Its Manufacture. In this method, known in America as the Hall process and in Europe as the Heroult process, aluminum ore in the form of bauxite is mixed with a readily fusible mineral called cryolite. An electric current is passed through the mixture. The poorly conducting mixture soon becomes hot enough to melt the cryolite. The bauxite dissolves in the molten cryolite and is decomposed by the current. Molten aluminum is set free at the negative electrode and runs down to the bottom of the crucible, whence it is drawn off through a tap-hole. At the positive electrode oxygen is set free. The operation is carried on in a furnace which is practically a huge crucible made of blocks of carbon. The positive electrode is composed of heavy carbon plates or cylinders. This is attached to a chain and a derrick so it can be lowered into the crucible as fast as the end is burned off by the liberated or nascent oxygen (see HYDROGEN PEROXIDE). The carbon-lined crucible is itself the negative electrode. The bauxite is fed into the crucible as fast as it is reduced, and the process continues until the carbon electrode has been entirely consumed. An ordinary furnace will produce about 400 pounds in twenty-four hours.

Production and Prices. The first smelter using the Hall process was built in Pittsburgh in 1889, and in 1895 the works were moved to Niagara Falls so as to take advantage of the cheap water power there for the production of the electric power. A third large smelter is at Shawinigan Falls, Que. The production of aluminum in the United States increased from 1.5 tons in 1886 to 75 tons in 1891, 3,575 tons in 1901 and 23,062 tons in 1911. The average annual production is now 35,000 to 40,000 tons. In Canada, the annual average has increased from less than 1,000 tons to 15,000 tons; all the aluminum produced in Canada is from imported ores.

At the same time that the production of aluminum has increased, its price has decreased. In 1855 the chemists sold it at the rate of $90 a pound. By 1890 the price had fallen to $2 a pound, and to-day it fluctuates from eighteen to twenty-five cents, the average being about twenty cents. This enormous decrease in price is the result of perfected processes of manufacture and of the increase in use. One vast and comparatively new demand for it is in the manufacture of automobiles, both body and chassis. J.F.S.

Consult 1911 Bulletin of United States Geological Survey, *Mineral Resources of the United States;* Minet's *The Production of Aluminum and Its Industrial Use.*

AL'VA, or AL'BA, FERDINAND ALVAREZ DE TOLEDO, Duke of (1508-1582), a Spanish general and statesman whose name became a synonym for cruelty and tyranny. Under Charles V and Philip II he fought in the armies of Spain, winning some distinction, but his real part in history did not begin until he was sent in 1567 as governor to the Netherlands. Philip II had given him authority to reduce the country to order, and thorough

indeed were his methods. He carried before his "Council of Blood" all who presumed to question his deeds, and all who had property which he coveted, and their condemnation was sure and speedy. He had Egmont and Horn executed, compelled William of Orange to flee to Germany, and made life in the Netherlands so unendurable that many merchants and mechanics emigrated to England. But his tyranny worked its own defeat, for Holland and Zealand rose against him, his fleet was destroyed, and finally he was recalled to Spain at his own request. In Spain he was given a genuine ovation, and later he confirmed himself in the good graces of his king by defeating the Portuguese in a decisive campaign.

ALVARADO, *ahl va rah' tho,* PEDRO DE (about 1499-1541), one of the early Spaniards in America, in search of gold and adventure, whom circumstances made the conqueror of Guatemala. He was born at Badajoz, Spain, and in his youth began a more or less exciting career in the New World. He was the companion of Cortez in the latter's conquest of Mexico (1519-1521), and in 1523 was ordered to subdue the tribes of Guatemala. On the completion of this task he returned to Spain to receive from Charles V the appointment of governor of Guatemala. Later he made a dash across the Andes Mountains, with a force of 500 soldiers to conquer Quito, but found Pizarro and Almagro ahead of him in that field. In 1537 Alvarado was made governor of Honduras. In 1541 he was crushed under his fallen horse during a fight with the Indians.

AL ' VERSTONE, Lord (formerly Sir Richard Webster, 1842-1915), a distinguished English jurist, formerly attorney general of the United Kingdom, and since 1900 Lord Chief Justice. He acted for Great Britain in the Bering Sea arbitration of 1893, and in the boundary dispute between British Guiana and Venezuela in 1898. In 1903 Lord Alverstone was president of the commission chosen to settle the boundary dispute between Alaska and Canada, and cast his vote in favor of the United States, securing for that country control of the Pacific coast.

ALYSSUM, SWEET, See SWEET ALYSSUM.

AMALEKITES, *am' a lek ites,* a wandering tribe of Arabs with whom, from the sixteenth to the seventh century B.C., the Israelites came into fierce conflict, both during their years in the Wilderness (*Exodus* XVII, 8-16), and after their settlement in Canaan. No tribe was more bitterly hated by the Israelites, who determined to exterminate them. Saul almost succeeded in doing this (*I Samuel* XV, 2) but there remained a strong and desperate band, against whom David later fought successfully (*I Samuel,* XXX, 1-20). In the days of Hezekiah the utter destruction of the Amalekites was finally achieved (*I Chronicles* IV, 43).

AMALGAM, *a mal' gam.* When mercury is brought in contact with some other metal, what is known as *amalgam* is formed. In mining operations mercury is used to extract free gold and silver from their ores. Tin amalgam was formerly used for silvering mirrors, but real silver is now invariably used. To fill the cavities in decaying teeth, dentists mix mercury with alloys of silver with other metals. In the tooth the soft amalgam soon sets to a hard, durable filling. The zinc plates of electric batteries are sometimes "amalgamated" by rubbing the surface with mercury. This prevents the zinc from dissolving in the battery liquids when the cells are not in use. The word *amalgam* is probably derived from the Greek *malagmos,* meaning *soft.* See ALLOY.

AMANA, *a mah' na,* a German religious society founded in 1714, by Eberhard Gruber, at Wetterau, and now centered at Amana, Iowa, a community of seven villages twenty-eight miles west of Iowa City. The members came to the United States in 1843, began the settlement in Iowa in 1855, and the society was incorporated under its present name in 1859. Amana is the name of a mountain mentioned in *Songs of Solomon,* IV, 8, and means *true* or *fixed.*

The community is directed by a president and a board of thirteen, each village having its own board of elders. Though family life is maintained, meals are prepared and served in "kitchen-houses," and the society as a whole carries on manufacturing, agriculture and other work. In 1913 there were about 1,800 persons in the community. They own about 26,000 acres of land, having a value of $1,800,000. All of these people dress plainly and in sober colors.

AMARANTH, *am' a ranth,* a word which means *unfading,* and is therefore used as the name of various flowers which have dry, scaly petals that keep their color a long time after they are plucked. So well known are the flowers and so celebrated their quality that they have given to the English language the adjective *amaranthine,* meaning *undying.* Thus Wordsworth speaks of "the amaranthine flower

of faith." *Everlastings* is another name for the same flowers, which are frequently used during the winter for decorative purposes. Most of the brilliant red, green, yellow and purple ones, however, which are to be seen in Christmas wreaths have been dyed. The coxcomb and prince's feather, often seen in gardens, are species of amaranth.

AMARIL'LO, TEXAS, the county seat of Potter County, centrally located in the "Panhandle," the northwestern part of the state. The nearest large city, Oklahoma City, is 273 miles east; Fort Worth is 336 miles southeast, and Denver is 467 miles northwest. Three railroad lines intersect at Amarillo—the Fort Worth & Denver City; the Atchison, Topeka & Santa Fe, and the Chicago, Rock Island & Gulf. The population in 1900 was 1,442; in 1910, 9,956; in 1920, 15,494. The area of the city is three and a half square miles.

Amarillo is the commercial center for a vast section of cattle country. Level, dry, but fertile, plains extend in every direction. The city obtains an abundant supply of water for every purpose from a lake 200 feet underground. The city reflects the character of the country; it is one of the largest cattle shipping points in the United States, and also ships great quantities of flour and wheat. The important manufactures include leather goods, saddles, harness and shoes; there are also ice plants and grain elevators.

From a small settlement near a large cattle corral, Amarillo in fifteen years became a city of paved streets, electric lights, street car service, fine residences and public buildings. Among the latter are the Federal building, completed in 1916, costing $200,000; a city hall, a courthouse, and a city hospital. In addition to the public schools, in which the community takes a great deal of pride, there are Saint Mary's Academy and a business college. The commission form of government was adopted in the year 1914. T.T.

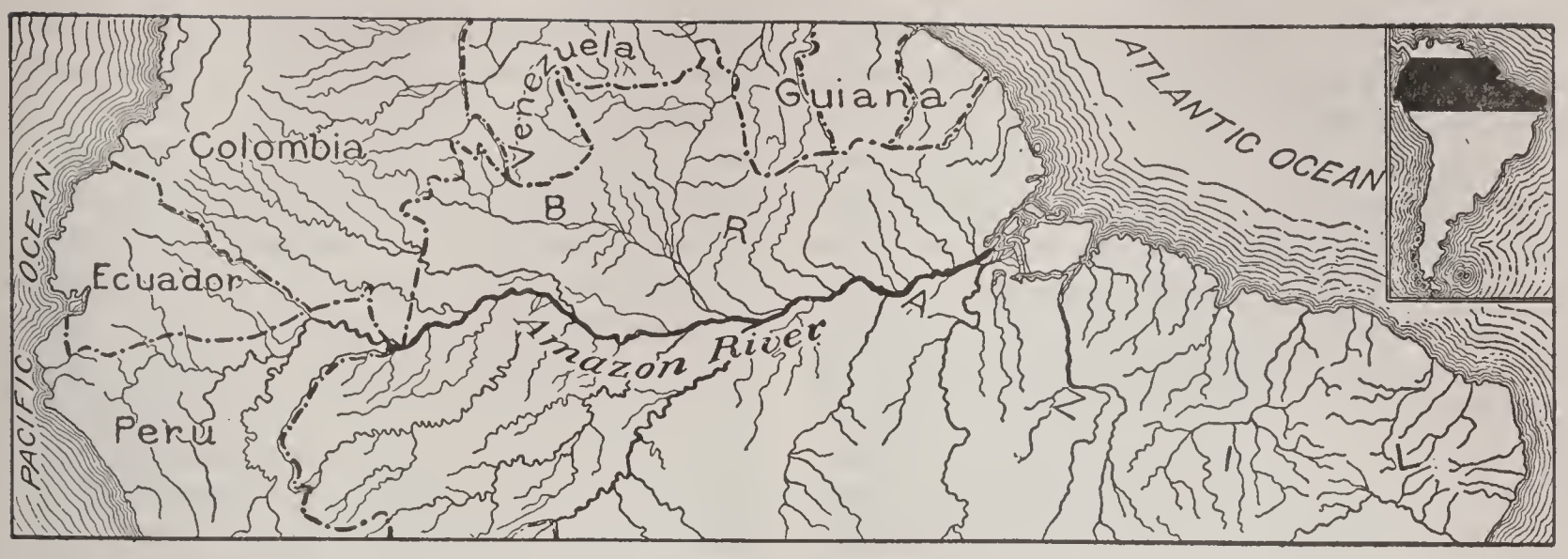
AMARYLLIS, *am a ril' is,* **FAMILY,** lily-like plants, of which one species was formerly supposed to be the Biblical "lily of the field," which "toils not, neither does it spin." In general the members of the Amaryllis family spring from bulbs and bear beautiful, highly-colored flowers, many of which are highly prized in gardens and hothouses. The snowdrop, the daffodil and the narcissus are everywhere familiar, and the century-plant grows profusely in warm climates. The bulb of a certain South African species known as the blood-flower is so poisonous that the Hottentots use the juice to anoint their deadly arrow-

BELONGING TO THE AMARYLLIS FAMILY
(*a*) Belladonna lily; (*b*) Narcissus; (*c*) Star grass.

heads, and the bulb of the common narcissus is strongly emetic. The most valuable member of the family commercially is the agave, which is treated under the title CENTURY-PLANT.

AMAZON, *am' a zon,* the great river of South America, and with its tributaries the largest river system in the world. The origin of the name is uncertain, but it is usually credited to one of the early Spanish explorers. His party was attacked by a band of natives, including many women, whose presence suggested the name of the warlike women of Greek mythology (see AMAZONS). The Amazon is the only great river in the world whose general direction is east and west, all others being north and south. The total length of the main river is 3,300 miles, about 100 miles longer than the distance from New York to San Francisco, and its drainage basin has a total area of 2,500,000 square miles, equal to five-sixths of the United States, excluding Alaska. The river is navigable for ocean steamers as far as Iquitos, 2,300 miles from the Atlantic, and up to this point it has an average depth of 120 to 150 feet during the rainy season. For nearly 500 miles beyond Iquitos it is navigable for steamers drawing no more than fourteen feet of water, and smaller vessels have ascended even higher. The total length of navigable rivers in the system is about 15,000 miles.

The Amazon is formed by the junction of two main branches, the Marañon and the Ucayali. The Marañon, which rises in the Andes only sixty miles from the Pacific Ocean, has its source farther west than the Ucayali, but the latter, being larger, is usually called the chief branch. In its long course the Ama-



THE COURSE OF THE MIGHTY AMAZON

Some of its tributaries are among the great streams of the world. The smaller map, in its black portion, indicates the part of South America which appears in the larger space.

zon receives over 200 tributaries, the most important of which are treated elsewhere (see JAPURA, JURNA, MADEIRA; RIO NEGRO; TAPAJOS; TOCANTINS; XINGU).

Much of the Amazon is really a great basin rather than a river, and the lower section, at least, was once a gulf of the ocean. After it leaves the Andes, there is a scarcely perceptible fall. Where it leaves Peru and enters Brazil it is already a mile wide, but is only 300 feet above the level of the Atlantic, and in the last 400 miles its average fall is only one-eighth of an inch per mile. Yet so enormous is the mass of water which the river receives from its tributaries that it flows at the rate of two and one-half to three miles an hour and discharges at its mouth between 4,000,000 and 5,000,000 cubic feet of water per second. In a single day this discharge would make a lake twenty-five miles long and four to five miles wide, with a uniform depth of 100 feet.

Throughout most of its course the banks of the Amazon are little higher than the stream. In the rainy season the river floods the lowlands, sometimes covering several hundred thousand square miles. Though the true course of the river is from four to six miles wide, there are numerous side channels, which it is possible to ascend for hundreds of miles without even entering the main channel. Below Obidos (see colored map, SOUTH AMERICA), the river widens gradually, until, at its mouth, it reaches a maximum of 207 miles. Lying in the mouth is the island of Marajos, which is larger than the combined areas of Massachusetts, Connecticut and Rhode Island, and is about equal in size to the kingdom of Denmark. The river current is noticeable in the ocean 200 miles from shore because of the discolored water, and at high tide the current is reversed for 400 miles inland. The inrush of the tide is so great that it frequently creates a *bore* or *pororoca,* a wall of water from twelve to twenty-five feet high (see BORE).

For the plant and animal life of the Amazon basin, and the character of the commerce carried on the river, see BRAZIL. W.F.Z.

Consult Mozans' *Along the Andes and Down the Amazon;* Lange's *In the Amazon Jungle.*

AMAZONS, a race of warlike women who, according to ancient Greek tradition, either

AN AMAZON

This illustration is of a statue of an Amazon, in the Royal Museum, Berlin, Germany. The sculptor intended to convey an impression of the bravery, strength and daring of these women of tradition.

permitted no men to reside among them, or kept them in a state of slavery. They are generally supposed to have inhabited the region on the banks of the river Thermodon,

in Asia Minor. The most notable city established by them was Ephesus, where they built magnificent temples for the worship of Ares (Mars) and Artemis (Diana). The Amazons were defeated by Hercules, who sought the girdle of their queen Hippolyta; later when leading their armies to the help of Troy, the Amazonian queen was slain by Achilles. The race was finally exterminated by Theseus and the Athenians. It is said that the Amazons burned off their right breast that it might not impede them in the use of the bow; old sculptures, however, do not show such mutilation. In Greek art they are usually represented as riding on horseback, carrying a lance, bow or battle axe and a shield.

AMBAS'SADOR, a diplomatic officer of the highest rank, employed by one country at the court or capital of another. He is entrusted with the proper development of those matters which affect the governmental relations—or political relations—of the two countries. In this respect diplomatic officers of all grades differ from consuls, who are appointed to develop trade relations only.

Ambassadors are *ordinary* when they are regularly appointed for a stated period at a foreign court, or *extraordinary,* when they are sent on a special mission. When ambassadors extraordinary have full powers, as of concluding peace, making treaties, and the like they are called *plenipotentiaries.* Until 1896 the United States sent no ambassadors to foreign countries, but was represented by *ministers-plenipotentiary,* appointed by the President with approval of the Senate. In the above year the ministers to Germany, France, England and Italy were raised to the rank of ambassadors in recognition of similar action upon the part of those governments, and since that time the post of minister-plenipotentiary has been raised to ambassador for Argentine, Brazil, Chile, Japan, Mexico, Russia, Spain and Turkey.

The United States pays the ambassadors it sends to foreign courts $17,500 per year, but does not furnish them residences or offices abroad or make an appropriation for such expenses. On the contrary, a number of European ambassadors to the United States live in fine residences owned by their governments and receive salaries ranging from $20,000 to $50,000, the latter being the salary of the British ambassador to the United States. See DIPLOMACY.

AMBER, *am' bur.* As the pine trees of today secrete a sticky, yellowish resin, so did those of thousands and hundreds of thousands of years ago, and when those trees were buried under the ground or under the water, during the great changes which took place in the earth's surface, the lumps of resin gradually hardened or fossilized into the beautiful substance which is known as amber. To-day these irregularly-shaped lumps, which occasionally reach a size of from ten to fifteen pounds but which are generally much smaller, are dug up from the shores of the Baltic Sea and the North Sea, and in a few places in Great Britain and the United States. The pale yellow or yellowish-brown substance, with its characteristic luster, is much used in making cigar-holders, mouthpieces for pipes and beads, and the ash obtained by burning it forms the basis of the finest black varnish. In the beginning amber was in soft form, and often specimens are found in which are imbedded the remains of insects; and the fact that these insects are always of species which no longer exist proves that it was ages ago that the amber was secreted.

The ancient Greeks obtained amber from the shores of the Baltic Sea, just where it is most plentiful to-day, and they called it *elektron.* One of their philosophers, interested in the properties of matter, discovered that if this substance were rubbed briskly it became capable of attracting to itself light objects, such as straws and bits of paper. This strange quality, which gave to man his first knowledge of electricity, was never lost sight of, and centuries afterward, when the study of this property in certain objects became a real science and a name was needed for it, the name *electricity,* taken from the Greek *elektron,* was chosen. The English form of *elektron* is *electron.* See ELECTRICITY.

AMBERGRIS, *am' bur grees,* the most valuable product of the sperm whale, sought for especially because of its importance in the perfume industry. For several centuries before its true nature was known, it was familiar as a substance often found floating in lumps, some of which weighed 200 pounds. Its source is the whale's intestines; it is wax-like and gray, yellow, black or variegated in color. See WHALE.

AMBITION, *am bi' shun.* Most words have fascinating life-stories, and *ambition* is no exception, for its derivation is rich in historical interest. Long ago, in the days of ancient Rome, those who were candidates for public

office went about from house to house soliciting votes. This practice received the name of *ambitio,* meaning *going about canvassing,* from *ambio,* signifying *I go around.*

"Vaulting Ambition." From such an origin the word has come to be used to characterize that selfish, overmastering desire for power, fame or wealth that stops at nothing until the goal is reached. In this sense it is rightly considered "one of the meanest of passions," as some one has stigmatized it. It was this type of ambition that Shakespeare had in mind when he wrote of "virtue choked with foul ambition," and "vaulting ambition, which o'erleaps itself."

The student of history finds striking examples of inordinate ambition in such figures as Caesar, Napoleon, Richelieu and Wolsey, Talleyrand, and in more modern days, King Ferdinand of Bulgaria, in whose ambition to make Bulgaria the Prussia of the Balkan states lay the source of the two recent Balkan wars. In literature the outstanding type of unscrupulous and futile ambition is the character of Macbeth, as delineated by the master-hand of Shakespeare. Uriah Heep in *David Copperfield* is a familiar example of overweening ambition, although on a petty scale. In the land of fable we have the tale of the frog who, ambitious to be as big as the ox, puffed himself to the point of bursting. Mythology, too, is full of stories illustrating the folly of ambition carried to an extreme; for instance, the myth of Phaethon, who was ambitious to drive the chariot of the sun; Icarus and his father, who made themselves wings of wax, thinking to soar to the abode of the gods; King Midas, dreaming of possessing unlimited gold and coming to grief through the sudden realization of his selfish dream.

Praiseworthy Ambition. As the Roman rhetorician Quintilian sagely remarked, "Though ambition in itself is a vice, yet it is often the parent of virtues." To attain great wealth or personal glory a man must usually renounce ease, comfort and self-indulgence; he must develop habits of persistence, industry, economy, study and unresting activity, depending upon the goal at which he is aiming. In this way, perhaps, it has come about that the word is now applied also in a favorable sense, meaning the eager aspiration toward higher things, the steadfast determination and unflagging effort which lead to the achievement of some worthy purpose. It is a creditable ambition to improve character, to develop ability, to reach out after a broader education, to give a higher quality of service to the world. Great public benefactors like Clara Barton, Jane Addams and Luther Burbank; captains of industry like Marshall Field, great merchant, and James J. Hill, builder of railroads; inventors like Stephenson, Edison and Marconi; daring explorers like Captain Scott, Amundsen and Peary—all these were fired with the high ambition to do some real work in the world. Ambition is a virtue or a vice, then, according to its object and the means employed in attaining that object.

Ambition and Emulation. Emulation consists in trying to surpass some one else's record. It is emulation that inspires a boy or girl in school to strive for marks and prizes rather than true knowledge and to rest content with distancing the others in his class, regardless of what the victory means to him personally. Ambition is "made of sterner stuff." Ambition keeps the boy or girl, man or woman, constantly pushing forward toward a clearly-visioned goal, ever trying to *get ahead of himself.* Ambition looks to the surpassing of *yesterday's* record, not a neighbor's achievement. It was true ambition that enabled the great artist, Joshua Reynolds, to reply, when asked how he had developed his remarkable ability, "By observing one simple rule; namely, to make each picture the best." This suggests the famous motto of the Paulist Fathers, "Let the highest achievement of yesterday be the starting point of to-day." Such a desire to excel one's own best work is the best kind of ambition.

Cultivating Ambition. The spirit of ambition is natural to every child born into the world. It is like a young shoot which, properly encouraged, sends forth the blossoms of achievement and grows taller and stronger from year to year; neglected, it slowly withers and dies. Every boy and girl is entitled to home encouragement and help in bringing his ambitions to the point of fruition. He needs and should have home aids in the way of good books and magazines; he needs the interested coöperation of father and mother; he needs the loving, helpful hand stretched out to assist him in solving his individual problems.

Failing to receive such sympathy and assistance in realizing his ambitions, on meeting obstacles he finds himself utterly unable to cope with unaided, discouragement comes like a chilling wind and the tender plant of child-

ish ambition dies. The result is not only the failure of the particular object the child was cherishing; eventually it may mean also the death of all ambition, initiative and effort; till at length, through failing to progress, he has dropped so far behind in achievement that he can probably never regain that fine spirit of eager aspiration and confident trying which is his birthright. Ambition must be cultivated and fostered during the early years of childhood, especially, if it is to develop into the hardy governing motive that will shape a successful life. The world belongs to the energetic and the ambitious.

The Physical Side. It is also to be noted that educators struggling with the problem of the seemingly ambitionless pupil are now looking for the explanation, not only in a careless, unsympathetic home environment, but in physical causes, as well. Experiment and tests have shown that a large proportion of such cases spring from diseases of the ductless glands and from defective sight, hearing or breathing. When these defects receive expert medical attention the child quickly regains the ambition and energy characteristic of normal boys and girls. Given the right home conditions, he is then prepared to apply himself to the solution of his special problems of home, school and society, and to compete with his fellows with an equal chance of success. L.M.B.

Outline on Ambition

Motto:

"Too low they build who build beneath the stars."—Young's *Night Thoughts.*

Essay on Ambition:

(a) To develop our talents
(b) To make use of our opportunities
(c) To make some progress every day
(d) To serve worthily
(e) To make our ideal *real*

Biography:

Louisa M. Alcott
Bismarck
James G. Blaine
Henry Clay
Stephen A. Douglas
Alexander Hamilton
Wm. D. Howells
Abraham Lincoln
Benjamin West

Poems:

Longing—Lowell
Days—Emerson
The Gleam—Tennyson
Friend Brook—Lucy Larcom
The Chambered Nautilus—Holmes
The Song of the Chattahooche—Lanier

Supplementary Reading:

Gradatim—J. G. Holland
The Vision of Sir Launfal—Lowell
The Story of Dick Whittington
Myths of *Phaethon* and *Ariadne*
Essay, *Of Ambition*—Bacon

Quotations:

Hitch your wagon to a star.—Emerson.

If I shoot at the sun I may hit a star.—P. T. Barnum.

Be thou contented with thy lot in earthly things,
But be forever seeking after angels' wings.
—J. T. W.

An aspiration is a joy forever, a possession as solid as a landed estate.—R. L. Stevenson.

There is nothing noble in being superior to some other man. The true nobility is in being superior to your previous self.
—Hindoo Saying.

Aspire, break bonds, I say.
Endeavor to be good, and better still,
And best. Success is nought, endeavor's all.
—Browning.

AMBROSE, *am' broze,* Saint (about 340-397), one of the early Fathers of the Church, the first great writer of Latin hymns. He was elected bishop of Milan in 374, and became the patron saint of that city, where the famous Ambrosian Library was named in his honor. To his sermons the great Saint Augustine partly owed his conversion. Saint Ambrose was famed for his wisdom, gentleness and purity of life. His works, which show the influence of Greek writers, may be had in English translations.

AMBROSIA, *am bro' zhi a,* with nectar, in Greek and Roman myths, was considered the food and drink of the gods, and a substance that gave them their immortal youth. Not only did they eat and drink of ambrosia, but they bathed in it and used it as an ointment. A god who went without ambrosia for a time suffered a loss of power, while a mortal who fed on it gained godlike strength and immortality. The adjective *ambrosial,* meaning *sweet-smelling* or *delicious,* is derived from the word. It is so used in a familiar line from Tennyson's *In Memoriam,* "Sweet after showers, ambrosial air."

AMBULANCE, *am' bu lance,* from a Latin word meaning *to move about,* a vehicle used to carry the sick or injured to a place, usually a hospital, where they may receive medical attention. The modern hospital ambulance of the great cities is a four-wheeled vehicle drawn by horses or driven by electricity or gasoline. The latter, the automobile ambulance, is rapidly taking the place of the ambulance drawn by horses. These ambulances are constructed with rubber tires so that they run smoothly, and they carry one or two tiers of stretchers. Sometimes they are fitted with beds, surgical instruments and medicines;

nearly always surgeons accompany them. They respond promptly to calls for help, and as they are driven through the crowded streets a gong is kept ringing to warn other vehicles of their approach, for an ambulance has the right of way over all other vehicles except those of the police and fire departments. Each large city in all enlightened countries has its own system of ambulance service, controlled by the police, the hospitals or the city government.

Nearly all countries at the present time use the military ambulance service that was perfected in the United States during the War of Secession. In some European countries ambulances consist of entire railway trains fitted up as hospitals. The term is also applied to moving field hospitals that in war are carried about from place to place with the troops. Since the founding of the Red Cross Societies ambulance service on the field of battle has made striking progress. See Red Cross Societies.

AMEN, *a men',* a Hebrew word meaning *it is trustworthy,* or *be it so,* which was brought over without change of form into Greek and thence into Latin and the modern languages. It is used most commonly at the end of a prayer or hymn as a sort of summing up, a repeated wish that everything asked for may be granted, everything stated may be true. The "verily, verily" used in the New Testament frequently at the beginning of a statement is a translation of the word *amen.* Pronounced quite frequently *ay men* in ordinary speech, it is invariably *ah men* in singing and usually in poetry, as in the *Lost Chord,* where occurs the line, "Like the sound of a great Amen."

AMENDMENT, *a mend' ment,* a term applied in legislative procedure to the alteration or modification of an existing law by the addition of a new enactment relating to it. When an amendment has been adopted it becomes a part of the original. In parliamentary bodies amendments may be made to bills, resolutions or motions under consideration by the house. The rule followed everywhere is that an amendment to a resolution or bill may be amended, but that the amendment to the amendment cannot be further amended.

In the Congress of the United States one house may amend a bill which has passed the other house, but such bill, with the amendment, must be returned to the first body for approval. If further amended it must be returned to the other house; if no agreement is reached the bill is sent to a joint committee. The United States Constitution provides for its own amendment in these words (Art. V):

> "The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution; or, on the application of the legislature of two-thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes, as part of this constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided * * * that no state, without its consent, shall be deprived of its equal suffrage in the Senate."

AMERICA, *a mer' i ka,* a great land mass which exceeds in its north-to-south extent any other land area on the globe, and which divides throughout its entire length the Atlantic and Pacific oceans. Stretching as it does through 128° of latitude, from 72° N. to 56° S., it is 9,000 miles in length, and is washed at one extremity by the Arctic, at the other by the Antarctic, Ocean. Its greatest breadth, from the easternmost point of Brazil to the westernmost point of Peru, is over 3,000 miles, while its narrowest part, on the Isthmus of Panama, is little more than twenty-eight miles. The two great divisions, North America and South America, which make up the continent, are more or less similar in shape, since each is roughly triangular, with its greatest breadth toward the north.

Despite the fact that Columbus was the first European to take to Europe definite knowledge of the New World, Americus Vespucius received the honor of having his name given to it. Because Vespucius had explored and described the coast of Brazil, a mapmaker in 1507 suggested that that part of the newly-discovered hemisphere be called by his name, and the new title was gradually extended to cover all of South America. Still later, when the close connection between the two grand divisions was discovered, the one name was made to do duty for both. See North America; South America; Vespucius, Americus; Columbus, Christopher.

AMERICA, the national hymn of the United States, beginning with the words, "My country 'tis of thee." The words were written by the Reverend Samuel Smith (which see), and were first used in 1832 at a children's Fourth of July celebration in Boston. Years after-

ward, at a reunion of the Harvard class of which both Smith and Oliver Wendell Holmes were members, Holmes read a poem entitled *The Boys,* in which he spoke of Smith in the words:

Here's a nice youngster of excellent pith;
Fate tried to conceal him by naming him Smith,
But he chanted a song for the brave and the free;
Just read on his medal, "My country, of thee."

The music to *America* was borrowed from England, having been composed by Henry Carey about 1742. The English national hymn, *God Save the King,* is set to the same music, as is also the popular German patriotic song, *Heil dir in Siegerkranz.* The words of this best-known of America's national hymns are as follows:

My country, 'tis of thee,
Sweet land of liberty,
Of thee I sing;
Land where my fathers died,
Land of the pilgrims' pride,
From every mountain side
Let freedom ring.

My native country, thee—
Land of the noble free—
Thy name I love;
I love thy rocks and rills,
Thy woods and templed hills,
My heart with rapture thrills
Like that above.

Let music swell the breeze,
And ring from all the trees
Sweet freedom's song;
Let mortal tongues awake;
Let all that breathe partake;
Let rocks their silence break—
The sound prolong.

Our fathers' God, to thee,
Author of liberty,
To thee we sing:
Long may our land be bright
With freedom's holy light;
Protect us by thy might,
Great God, our King.

AMERICAN ACADEMY OF ARTS AND LETTERS, an organization of distinguished artists, musicians and authors, established in 1904. The members of the Academy, whose number is limited to fifty, are chosen from the National Institute of Arts and Letters, an organization of 250 members. The larger body was founded in 1898 by a committee of the American Social Science Association with the purpose of creating in the United States an association like the Institute of France. The committee named a small group of initial members, who were to elect other members. The membership was at first very small, but was later increased to 150, and finally to 250.

After the Institute had established itself, and included most of the prominent writers and artists of the United States, a new and smaller organization was planned, to be called the American Academy of Arts and Letters. Its constitution states that the purpose of the Academy is to further and represent the interests of fine arts and literature. The membership has gradually been increased to fifty.

AMERICANIZATION, the process of gradual assimilation of alien peoples, changing their customs and ideals, stamping them with American characteristics and developing in their consciousness a just appreciation of the land of their adoption

Immigrants who have reached middle age are likely to resist influences which would change the established current of their thought, though there are many exceptions to the rule. In a new land, surrounded by conditions they little understand, they retain their native group associations, for common protection, as they assume, and their social isolation is more or less complete. Those from Southern and Eastern Europe, particularly, colonize in the great cities, and thus in a congested center we may have a "little Italy," a Ghetto, a "little Russia," and the like, to which the residents bring the habits and customs of the land of their birth, and to these they resolutely adhere. While indeed in America, they are not a part of the real America.

The youthful mind is more plastic, and while the inborn influences of generations are strong, they cannot long resist the inevitable effects of contact with young America and the programs planned in campaigns to remove class and race consciousness. The spirit of emulation and imitation is strong in young people; it is seen that boys and girls, born in other lands, very soon acquire the dress of the land of their adoption. This is evidence of fertile ground in which to plant ideas of Americanism. Americanization efforts are directed to change the alien mind as completely as the change in costume. The public schools, playgrounds, social settlements, community centers and the printing press are effective means towards the end sought. But Americans themselves, by the example of good citizenship, loyalty, patriotism and knowledge of our institutions, are a large factor in the problem.

AMERICAN BEAUTY, a choice variety of cultivated rose, famous for the size of its

blossom and its rare coloring. The velvety petals of the showy, fragrant flowers are of a carmine-crimson shade, tinged with soft violet, and the blossoms are borne on long, thick woody stems. The peculiar hue of this rose is copied in dyes having the name "American Beauty Red." The flower was first produced in a rose nursery in Baltimore, Md., and was introduced to the trade by a florist of Washington, D. C. It is the favorite flower for social functions where expense is not considered, the choicer specimens bringing high prices. The retail price of the varieties sold at the ordinary florist shop is three to five dollars per dozen. Authorities on rose culture say that the amateur cannot hope to raise the American beauty with success, because this aristocrat among flowers demands skill and training, a certain temperature and a properly constructed hothouse for its cultivation.

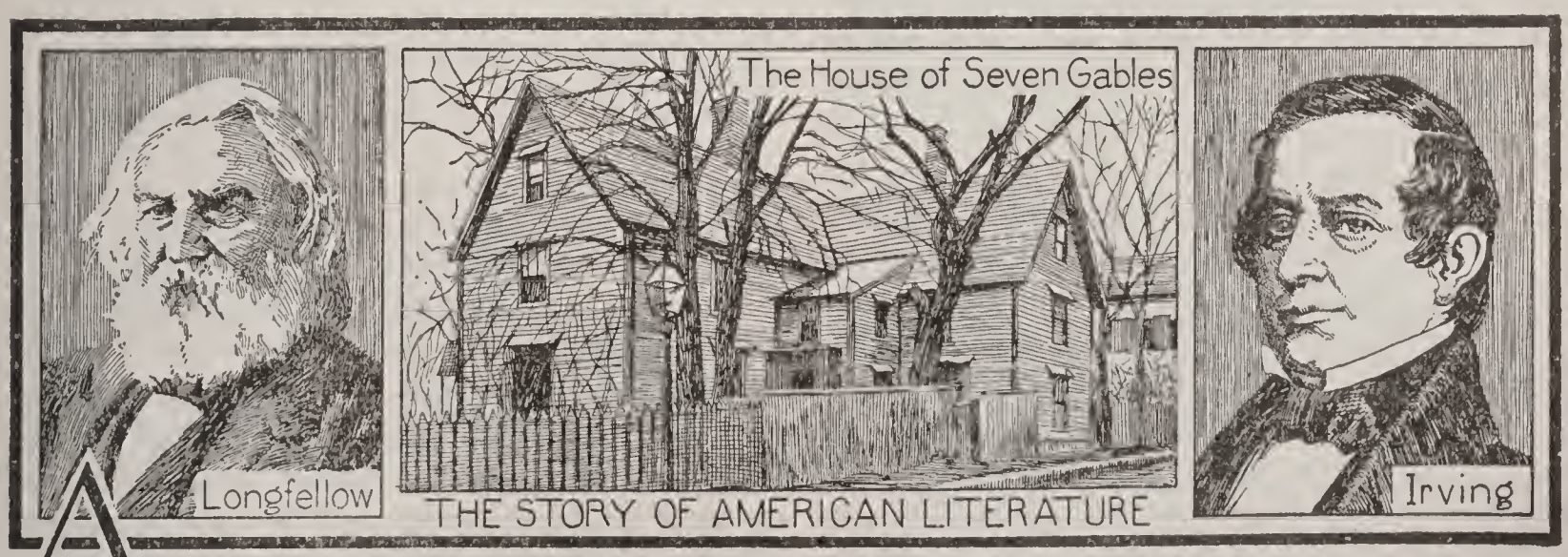
AMERICAN FEDERATION OF LABOR, a national federation of trade unions. For details of its history and organization, see LABOR ORGANIZATIONS.

AMERICAN GOLD'FINCH, YELLOWBIRD, or **THISTLE-BIRD,** sometimes called also the *wild canary,* is a lively and interesting little songster, found generally throughout the United States and also in parts of Canada and in Mexico. This bird is about four and three-fourths inches in length. In summer the male is a bright yellow, with black cap, wings and tail; the female is olive brown above, yellowish below, with wings and tail much like those of her mate. In the winter time the male dons a more sober coat, and then greatly resembles the female. The nest, a graceful little cup made of grass and vegetable fiber and lined with grass and plant down, is usually placed in a bush or in the crotch of a low tree. The eggs, numbering three to six, are spotlessly white or tinted green or greenish-blue.

The goldfinch is a sociable bird, and on the approach of spring, the males, dressed in their handsome new coats, may be seen in little groups, sitting on the branches of a tree, basking in the sun and warbling soft, pretty music. These birds are easily tamed, and when placed in cages in the home are almost as delightful a pet as the canary. The goldfinch is very fond of the seeds of the thistle, and thus is of value to man in keeping down the growth of this troublesome weed.

AMERICAN LEGION, a patriotic organization of former soldiers, marines and sailors who were enrolled in the service of the United States between April 6, 1917, and November 11, 1918. The Legion, to whose membership about 4,000,000 men are eligible, whether or not they saw service overseas, was organized in Saint Louis, Mo., early in May, 1919, and was incorporated by act of Congress September 6, 1919.

The object of the Legion is to uphold and defend the Constitution of the United States; to maintain law and order and teach pure Americanism to oppose autocratic tendencies in either the classes or the masses; to teach that right is superior to might; to safeguard justice; to promote peace and good will on earth; to make certain that there shall be transmitted to posterity the principles of freedom and real democracy, and to "sanctify the comradeship of the war by mutual helpfulness." In short, the members propose that what America fought for in the War of the Nations shall be preserved in its national life.



AMERICAN LITERATURE. In a sense, American literature is a part of English, since it makes use of the same language, but it has grown up under such different conditions, among such different surroundings, that it possesses a distinct identity. Many of Irving's essays, Hawthorne's *House of the Seven Gables,* Cooper's *Leather Stocking Tales,*

Longfellow's *Evangeline* are distinctly American, not merely because their scenes are laid in America, but because they breathe the spirit of the new land.

Its Beginnings. The United States has a history which dates back 300 years, and since many of the men who made its earliest history were scholars, it produced literature of a kind through all that period. But literature in the broader sense—those writings which all the reading world accepts and authorities class with really worthy productions—it has had for little more than a century.

They were serious folk, those early producers of literature in America, and the conditions in the new home were not such as to encourage artistic production. Histories of the colonies; dissertations on liberty, the desire for which had led many of them across the sea; profound theological treatises; solemn song books—these were the earliest output of the colonies. Occasionally one figure stood out far above the rest. There was Anne Bradstreet, for instance, the title-page of whose publications heralded her as "The Tenth Muse lately sprung up in America"; whose works, however, show nothing of the life of the new land to which she had come as a bride, but drone on about solemn "world facts."

Two of the greatest names in this very early history of literature in New England were those of Increase and Cotton Mather, autocratic father and ascetic son, whose works were highly regarded in their day, but have won no recognition from posterity. Jonathan Edwards had a more far-reaching influence, and his *Freedom of the Will* is still recognized as a masterpiece of reasoning.

The Stirring Revolutionary Times. These early figures in the literature of America seem very far away and indistinct, but with the thrilling events which led to the Revolution, and with the Revolution itself, there came into prominence a man who stands even to these later days as a typical American—Benjamin Franklin. His writings, and particularly his *Autobiography,* which ranks with the great biographies of all time, mark the beginning of a new era in American literature.

As the colonial period was interested most of all in religion, the Revolutionary era concerned itself chiefly with politics, and most of the great statesmen of the day left some mark on the literature of the period. The *Federalist,* the Declaration of Independence and Jefferson's *Autobiography* stand as monuments of this era when men were too much engaged in doing to find much time for writing.

No time is without its verse-writers, and this Revolutionary period had several, of whom only one, Philip Freneau, possessed enough force and originality to write verse that would live. The earliest novel-writer of note, Charles Brockden Brown, lived in this period, and his weird romances fairly bristle with horrors.

The National Era

The "Pioneers." Only with the nineteenth century did the United States begin to produce literature that attracted favorable attention abroad. Men had made permanent homes for themselves, had won the liberty without which they felt that life could not broaden to its full, and at length they had time for joy and for beauty. The first man to respond to the new, scarce-conscious demand and to win international recognition was Washington Irving, whose genial spirit no less than his delightful style makes him to this day one of the best-loved of American authors. In poetry, the great name of those early days was that of Bryant, whose *Thanatopsis* stands as "an event and a landmark" in American literature. It is impossible to imagine a present-day boy of seventeen producing such a poem, yet that was Bryant's age when he wrote:

So live that when thy summons comes to join
The innumerable caravan, which moves
To that mysterious realm, where each shall take
His chamber in the silent halls of death,
Thou go not, like the quarry-slave at night,
Scourged to his dungeon, but, sustained and soothed
By an unfaltering trust, approach thy grave
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams.

Another outstanding figure in the early half of the century was James Fenimore Cooper, whose *Spy,* published in 1821, was the first typically American novel. He almost always has "a forest trail to follow or a windy sea to sail," and his stories will live for the action in which they abound. With this pioneer group, too, must be reckoned Edgar Allan Poe, accounted by many critics the supreme genius in the history of American literature. It is difficult to say which is more masterly, his

prose or his poetry. Certainly little in the entire range of literature in English can surpass in pure music some of his verse.

> The skies they were ashen and sober;
> The leaves they were crisped and sere,
> The leaves they were wickering and sere;
> It was night in the lonesome October
> Of my most immemorial year;
> It was hard by the dim lake of Auber,
> In the misty mid-region of Weir:
> It was down by the dank tarn of Auber,
> In the ghoul-haunted woodland of Weir.

A lesser writer, but one much admired in his own day and still read with pleasure, was Nathaniel P. Willis, who wrote both prose and poetry.

Later Prose Writers. As writers become more numerous it is simpler to consider separately the two great branches, prose-writers and poets, though some have attained distinction in both. The two men who stand in the very front rank among men of letters, if the opinion of the majority of critics be taken, were born early in the nineteenth century—Emerson in 1803 and Hawthorne a year later. The philosophy of the one, with its inspiring, prophetic note, and the romances of the other, with their perfect artistry, made it apparent that the formative period of American literature was over. Prescott, Motley and Parkman proved that the United States could not only make history, but write it, and they left a worthy tradition of historic writing which later writers, such as Fiske, Roosevelt and Wilson, have worthily supported.

Contemporary with Emerson and Hawthorne, but claimed by a later period because they lived longer, were Oliver Wendell Holmes and James Russell Lowell. Both wrote poetry, and Lowell especially is known for that rather than for his prose works, but his essays marked an epoch in the history of criticism in America. Holmes's *Autocrat of the Breakfast Table,* with its delightfully-intimate but scholarly style, ranks as one of the classics of literature. A charming example of Holmes's clever way of treating his material is the following:

> When we are as yet small children, long before the time when those two grown ladies offer us the choice of Hercules, there comes to us a youthful angel, holding in his right hand cubes like dice, and in his left spheres like marbles. The cubes are of stainless ivory, and on each is written in letters of gold—TRUTH. The spheres are veined and streaked and spotted beneath, with a dark crimson flush above where the light falls on them, and in a certain aspect you can make out upon every one of them the three letters, L, I, E.
>
> The child to whom they are offered very probably clutches at both. The spheres are the most convenient things in the world; they roll with the least possible impulse just where the child would have them. The cubes will not roll at all; they have a great talent for standing still, and always keep right side up. But very soon the young philosopher finds that things which roll so easily are very apt to roll into the wrong corner, and to get out of his way when he most wants them, while he always knows where to find the others, which stay where they are left.

Of later prose writers, many have attained distinction, especially in the field of fiction. Harriet Beecher Stowe, Howells, Mary E. Wilkins Freeman, Henry James, Silas Weir Mitchell, Bret Harte, Edward Eggleston—each name stands for something distinctive in American literature. It is impossible to think of Mrs. Stowe, for instance, without connecting her with her epoch-making *Uncle Tom's Cabin;* of Mary E. Wilkins Freeman without calling up pictures, wonderfully clear but none too cheerful, of New England life; of Edward Eggleston without associating him with picturesque pioneer days in Indiana. A novelist, too, was Samuel Clemens (Mark Twain), but his humor was so distinctive and distinguishing a characteristic that his genuine story-telling power has not always been appreciated by all Americans.

More recently, there has been an ever-expanding list. The drama may flourish or languish, poetry go unheard, essays gather dust, but the stream of fiction flows on. To name but a few of the outstanding figures, there have been Joel Chandler Harris, Frank Norris, James Lane Allen, Edith Wharton, George W. Cable, Anthony Hope Hawkins, Margaret Deland, Booth Tarkington, Gertrude Atherton, Winston Churchill and Robert Herrick. In the article NOVEL there is given a list of the fiction-writers treated in these volumes, and that index includes not merely those named above, but numerous others.

Poets. Those New England contemporaries, Holmes, Emerson and Lowell, who produced some of the finest of American prose, formed with Longfellow and Whittier the most distinguished group of poets the United States has yet seen. Critics may declare that some of these were popular poets rather than great poets, but criticism cannot loosen the firm hold which they have on the affections of their readers. Longfellow's *Hiawatha* stands to thousands as the supreme epic of America, and the schoolboy never ceases to thrill at hearing how—

Forth upon the Gitche Gumee,
Of the shining Big-Sea-Water,
With his fishing-line of cedar,
Of the twisted bark of cedar,
Forth to catch the sturgeon Nahma,
Mishe-Nahma, King of Fishes,
In his birch-canoe exulting,
All alone went Hiawatha;

while every returning winter makes new and fresh the charm of Whittier's *Snowbound:*

Unwarmed by any sunset light
The gray day darkened into night,
A night made hoary with the swarm
And whirl-dance of the blinding storm,
As zigzag, wavering to and fro,
Crossed and recrossed the winged snow:
And ere the early bedtime came
The white drift piled the window-frame,
And through the glass the clothes-line posts
Looked in like tall and sheeted ghosts.

Whitman and Lanier, two other poets, one representing New York and one the South, it is interesting to contrast. Lanier said of Whitman that he was "poetry's butcher," who gives us "huge, raw collops slashed from the rump of poetry"; and it is not difficult to understand the aversion which the writer of exquisite music felt for the other's rough-hewn measures. Contrast Whitman's—

Creeds and schools in abeyance,
Retiring back awhile sufficed at what they are,
but never forgotten,
I harbor for good or bad, I permit to speak at
every hazard,
Nature without check with original energy.

with Lanier's—

Out of the hills of Habersham,
Down the valleys of Hall,
I hurry amain to reach the plain,
Run the rapid and leap the fall,
Split at the rock and together again,
Accept my bed, or narrow or wide,
And flee from folly on every side
With a lover's pain to attain the plain
Far from the hills of Habersham,
Far from the valleys of Hall.

Poe and Lanier are the most conspicuous poetic geniuses the South has produced, but a number of others have done very creditable work. Noteworthy among these are Paul Hamilton Hayne, William Gilmore Simms and Henry Timrod, all of whom have places in any anthology which attempts to include what is most representative in American poetry.

In recent years Eugene Field and James Whitcomb Riley have made a special appeal to the popular heart. Differing in many ways, they were alike in this, that they knew how to find the poetry, the tenderness, in everyday things and how to treat of them so simply that the man who cares little or nothing for other poetry finds heartfelt pleasure in theirs. Field is especially the poet of children—his lullabies have a swaying motion, his "real boy" poems a swing and "go" that make them favorites everywhere. Sometimes the touch of pathos is strong, as in *Little Boy Blue:*

The little toy dog is covered with dust,
But sturdy and stanch he stands;
And the little toy soldier is red with rust,
And his musket moulds in his hands.
Time was when the little toy dog was new,
And the soldier was passing fair;
And that was the time when our Little Boy Blue
Kissed them and put them there.

But more often he sings of happy children, like the very real little boy who declares that

I'd like to be a cowboy, and ride a fiery horse
'Way out into the big an' boundin' west;
I'd kill the bears an' catymounts and wolves I
came across,
An' I'd pluck the bald-head eagle from his nest.
With my pistol by my side I'd roam the prairies
wide,
An' to scalp the savage Injine in his wigwam
would I ride—
If I durst—but I *dursn't!*

Riley treats with kindly sentiment all phases of the Indiana life he knows so well, using frequently the Hoosier "dialect," as in

Little Orphant Annie's come to our house to
stay,
An' wash the cups an' saucers up, and brush the
crumbs away,
An' shoo the chickens off the porch, an' dust the
hearth, an' sweep,
An' make the fire, an' bake the bread, an' earn
her board-an'-keep;
An' all us other children, when the supper things
is done,
We set around the kitchen fire an' has the
mostest fun
A-list'nin' to the witch-tales 'at Annie tells
about,
An' the Gobble-uns 'at gits you
Ef you
Don't
Watch
Out!

It is possible at almost any time to pick up a literary magazine and find discussion as to whether or not poetry is on the decline, but in general a more optimistic note appears in these than was noticeable a few years ago. Recent years have produced no great poets—some critics believe that the world will never again see a Shelley or a Wordsworth; but there have been many whose true inspiration cannot be denied, many who have "followed

AN OUTLINE ON AMERICAN LITERATURE

A special article on each author named appears in its alphabetical place in these volumes.

I. EARLY PERIOD

Poets and Their Chief Works

Anne Bradstreet. 1612-1672
Several Poems Compiled with Great Variety of Wit and Learning
Philip Freneau. 1752-1832
The Home of Night
Francis Scott Key. 1780-1843
The Star-Spangled Banner

Prose Writers and Their Chief Works

Cotton Mather. 1663-1728
Magnalia
Jonathan Edwards. 1703-1757
Freedom of the Will
Benjamin Franklin. 1706-1790
Autobiography
Thomas Jefferson. 1743-1826
Declaration of Independence
Alexander Hamilton. 1757-1804
Federalist papers
John Jay. 1745-1829
Federalist papers
James Madison. 1751-1836
Federalist papers

II. NATIONAL PERIOD

Novelists

James Fenimore Cooper. 1789-1851
"Leather Stocking" Tales
The Spy
Nathaniel Hawthorne. 1804-1864
The Scarlet Letter
The House of the Seven Gables
Harriet Beecher Stowe. 1811-1896
Uncle Tom's Cabin
Dred
Bret Harte. 1839-1902
The Luck of Roaring Camp
Tennessee's Partner
Louisa M. Alcott. 1832-1888
Little Women
An Old-Fashioned Girl
Samuel L. Clemens. 1835-1910
Innocents Abroad
Tom Sawyer
William Dean Howells. 1837-
A Modern Instance
The Rise of Silas Lapham
Henry James. 1834-1916
The Portrait of a Lady
Daisy Miller
Frank R. Stockton. 1834-1902
Rudder Grange
The Lady or the Tiger?
Silas Weir Mitchell. 1829-1914
Hugh Wynne, Free Quaker
Thomas Bailey Aldrich. 1837-1907
Story of a Bad Boy
J. G. Holland. 1819-1881
Arthur Bonnicastle
F. Marion Crawford. 1854-1909
Saracinesca
The Heart of Rome
Edward Eggleston. 1837-1902
The Hoosier Schoolmaster
Helen Hunt Jackson. 1831-1885
Ramona
Elizabeth Stuart Phelps Ward. 1844-1911
The Gates Ajar
Joel Chandler Harris. 1848-1908
Nights with Uncle Remus
Mary E. Wilkins Freeman. 1862-
The Portion of Labor
James Lane Allen. 1849-
The Choir Invisible
George Washington Cable. 1844-
Old Creole Days
Lew Wallace. 1827-1905
Ben Hur
Opie P. Read. 1852-
The Jucklins
Cyrus Townsend Brady. 1861-
The Island of Regeneration
Stephen Crane. 1870-1900
The Red Badge of Courage
F. Hopkinson Smith. 1838-1915
Caleb West: Master Diver
Edith Wharton. 1862-
The House of Mirth
Stewart Edward White. 1873-
The Blazed Trail
Mary Elizabeth Dodge. 1838-1905
Hans Brinker
Henry Van Dyke. 1852-
The Blue Flower
Newton Booth Tarkington. 1869-
The Gentleman from Indiana
John Townsend Trowbridge. 1827-1916
Cudjo's Cave
Winston Churchill. 1871-
The Crisis
Margaretta W. C. Deland. 1857-
The Iron Woman
Richard Harding Davis. 1864-1916
Soldiers of Fortune

An Outline on American Literature—Continued

Gertrude Atherton. 1857-
The Conqueror
Mary Johnston. 1870-
The Long Roll
Hamlin Garland. 1860-
Victor Olnee's Disciples
Thomas Nelson Page. 1853-
Marsh Chan
Thomas Dixon. 1864-
The Clansman
Paul Leicester Ford. 1865-1902
The Honorable Peter Sterling
Mary Hallock Foote. 1847-
The Led Horse Claim
Mary N. Murfree. 1850-
The Story of Duciehurst
Kate Douglas Wiggin Riggs. 1859-
Rebecca of Sunnybrook Farm
Alice Hegan Rice. 1870-
Mrs. Wiggs of the Cabbage Patch
Gouverneur Morris. 1876-
The Voice in the Ricc
Owen Wister. 1860-
The Virginian
John Fox, Jr. 1863-1919
The Little Shepherd of Kingdom Come
Jack London. 1876-1916
The Call of the Wild
Josephine Daskam Bacon. 1876-
Memoirs of a Baby
Meredith Nicholson. 1866-
A Hoosier Chronicle
George Horace Lorimer. 1868-
Letters from a Self-Made Merchant to His Son
George Barr McCutcheon. 1866-
Graustark
Anna Katharine Green Rohlfs. 1846-
The Leavenworth Case
Adeline Dutton Train Whitney. 1824-1906
We Girls
Irving Bacheller. 1859-
Eben Holden
Upton Sinclair. 1878-
The Jungle
Clara Louise Burnham.
The Opened Shutters
Kirk Munroe. 1850-
The Flamingo Feather
Irvin S. Cobb. 1876-
Judge Priest
Ralph Henry Barbour. 1870-
Partners Three
Oliver Optic. 1822-1897
Young America Abroad
Rex Beach. 1877-
Heart of the Sunset
Robert Herrick. 1868-
Together
James Maurice Thompson. 1844-1901
Alice of Old Vincennes
Mary Roberts Rinehart. 1876-
The Street of Seven Stars

Critics

Horace Howard Furness. 1833-1912
Variorum Shakespeare
James Russell Lowell. 1819-1891
Among My Books
Brander Matthews. 1852-
Studies of the Stage
Margaret Fuller Ossoli. 1810-1850
Papers on Literature and Art
Edmund Clarence Stedman. 1833-1908
Victorian Poets
William Winter. 1836-
Shadows of the Stage

Dramatists

George Ade. 1866-
The County Chairman
David Belasco. 1862-
The Darling of the Gods
John Augustin Daly. 1838-1899
The Last Word
Clyde Fitch. 1865-1909
Nathan Hale
Percy Mackaye. 1875-
Sanctuary
William Vaughn Moody. 1869-1910
The Great Divide
Augustus Thomas. 1859-
The Witching Hour

Essayists

Ralph Waldo Emerson. 1803-1882
The Conduct of Life
Washington Irving. 1783-1859
The Sketch Book
Henry David Thoreau. 1817-1862
Walden
Oliver Wendell Holmes. 1809-1894
Autocrat of the Breakfast Table
Hamilton Wright Mabie. 1846-1917
In the Forest of Arden

Historians

George Bancroft 1800-1891
The United States of North America
Hubert Howe Bancroft, 1832-
History of the Pacific States
John Fiske. 1842-1901
The Critical Period in American History
Albert Bushnell Hart. 1854-
Guide to the Study of American History
Henry Cabot Lodge. 1850-
Hero Tales from American History

An Outline on American Literature—Continued

John L. Motley. 1814-1877
The Rise of the Dutch Republic
Francis Parkman. 1823-1893
France and England in North America
William H. Precsott. 1796-1859
Conquest of Mcxico.
Theodore Roosevelt. 1858-
Theodore Roosevelt, an Autobiography
Woodrow Wilson. 1856-
A History of the American People

Poets

William Cullen Bryant. 1794-1878
Thanatopsis
Edgar Allan Poe. 1809-1849
The Raven
Henry Wadsworth Longfelow. 1807-1882
Hiawatha
John Greenleaf Whittier. 1807-1892
Snowbound
James Russell Lowell. 1819-1891
The Vision of Sir Launfal
Ralph Waldo Emerson. 1803-1882
The Sphinx
Oliver Wendell Holmes. 1809-1894
The Chambered Nautilus
Walt Whitman. 1819-1892
Leaves of Grass
Nathaniel Parker Willis. 1806-1867
The Death of Absalom
Fitz-Greene Halleck. 1790-1867
Marco Bozzarris
Samuel Francis Smith. 1809-1895
My Country, 'Tis of Thee
Alice Cary. 1820-1871
Lyrics and Hymns
Phoebe Cary. 1824-1871
One Sweetly Solemn Thought
Thomas Buchanan Read. 1822-1872
Sheridan's Ride
Lucy Larcom 1826-1893
Hannah Binding Shoes
Will Carleton. 1845-1912
Betsy and I Are Out
Eugene Field. 1850-1895
With Trumpet and Drum
James Whitcomb Riley. 1853-1916
Rhymes of Childhood
The Lockerbie Book
Abram Joseph Ryan. 1839-1886
The Conquered Banner
Julia Ward Howe. 1819-1910
Battle Hymn of the Republic
Cincinnatus Heine Miller. 1841-1913
Songs of the Sierras
Edwin Markham. 1852-
The Man with the Hoc
Henry Van Dyke. 1852-
The Builders
William Vaughn Moody. 1869-1910
Gloucestcr Moors
Richard Watson Gilder. 1844-1909
Five Books of Song
Ednmund Clarence Stedman. 1833-1908
Pan in Wall Strect
Paul Lawrence Dunbar. 1872-1906
Candle-Lightin' Time
John Godfrey Saxe. 1816-1887
Fables and Legends
Frank L. Stanton. 1857-
Songs of the Soil
Edgar Lee Masters. 1868-
Spoon River Anthology
William Orlando Butler. 1793-1880
The Boatman's Horn
William Gilmore Simms. 1806-1870
Marion, "The Swamp Fox"
Paul Hamilton Hayne. 1830-1886
In the Wheat-Field
Samuel Minturn Peck. 1854-
The Grapevine Swing
Madison Cawein. 1865-1915
Kentucky Poems
Robert Loveman. 1864-
It isn't raining rain to me

Miscellaneous Writers

Thomas Paine. 1737-1809
Age of Reason
Jared Sparks. 1789-1866
Life of Benjamin Franklin
Donald G. Mitchell. 1822-1908
Reveries of a Bachelor
Edward Everett Hale. 1823-1909
The Man without a Country
George William Curtis. 1824-1892
Prue and I
Bayard Taylor. 1825-1878
The Lands of the Saracen
Charles Francis Adams. 1835-1915
Railroads, Their Origin and Problems
Henry Elisha Scudder. 1838-1902
James Russell Lowell
Hezekiah Butterworth. 1839-1905
Zigzag Journeys
Henry Woodfin Grady. 1851-1889
The New South
Nathan Haskell Dole. 1852-
Omar, the Tent-Maker
Frank G. Carpenter. 1855-
Geography Readers
Ida M. Tarbell. 1857-
History of the Standard Oil Company
Life of Abraham Lincoln
Elbert Hubbard. 1859-1915
Little Journeys series
Harry Stillwell Edwards. 1855-
Sons and Fathers

the gleam" with singleness of purpose and have written poems that will live. Among the older poets may be mentioned Joaquin Miller, Edwin Markham, Edward Rowland Sill, Thomas Bailey Aldrich and Richard Watson Gilder, while more recently William Vaughn Moody, Madison Cawein, Percy Mackaye and Edgar Lee Masters have won numerous admirers.

The last-named is representative of an interesting tendency in modern poetry. The old stanza, meter and rhyme, declare many of the present-day writers, hamper genius and make real poetic freedom impossible; and they adopt therefore a new form—or absence of form—which they call *free verse*. Not only does it refuse to be bound by restraints of meter, but it insists that all subjects are alike poetic, and that the true artist may see as much beauty in a display of red shoes in a window as in a riot of red roses in a garden. Their idea is not entirely new—Whitman was the strong advocate of just such a theory; but the new poets are not exactly followers of Whitman. One of the strongest of these free-verse writers is undoubtedly Edgar Lee Masters, whose *Spoon River Anthology* was one of the most discussed books of its year.

The above discussion has of necessity been of the most general sort, for it is intended to serve merely as a basis for more extended study. Each author here mentioned is given full discussion in these volumes under his own name, while the articles on ESSAY, NOVEL, POETRY, DRAMA and HISTORY contain information and index lists which should be used in connection with this study. See LITERATURE, sub-title *Literature for Children, or, Directing Children's Reading.* A.MC C.

Consult Bates's *American Literature;* Hawthorne and Lemmon's *American Literature;* Matthews' *An Introduction to the Study of American Literature;* Trent's *Southern Writers.*

AMERICAN UNIVERSITY, an educational institution of university rank opened at Washington, D. C., in 1914, under the auspices of the Methodist Episcopal Church. The first charter for the university was granted under the government of the District of Columbia in 1891. The plans for the institution included fellowships for graduate study, lectureships in Washington on matters of vital interest, and in other educational centers under the direction of the university, and the publication of important lectures and theses; all of these features were inaugurated during the first year of actual work, ending in May, 1915. A campus of ninety-two acres, overlooking the city of Washington and nearby districts in Maryland and Virginia, affords an attractive site, and buildings are being erected as funds are available. The total university holdings are valued at about $2,225,000. A college publication, called *The University Courier,* is issued every three months. The university is national in scope, and on its board of trustees are prominent men from various parts of the United States.

AMERICUS VESPUCIUS, *a mer' i kus ves pu' shus.* See VESPUCIUS, AMERICUS.

AMERICUS, *a mer' i kus,* GA., the county seat of Sumter County is in the southwestern part of the state, seventy-one miles southwest of Macon and sixty-four miles southeast of Columbus. It is at the junction of the Seaboard Air Line (with shops here), and the Central of Georgia railroads. The area is nearly five square miles. In 1910 the population was 8,063; in 1920 it was 9,010.

Settled in 1832, Americus was first chartered as a city in 1855 and rechartered in 1889. It is the seat of the State Agricultural College and has a Y. M. C. A. building and Carnegie Library. It is in a productive agricultural section; the principal crops are cotton, sugar cane, corn, pecans and fruit. The city has cotton-seed oil mills, fertilizer mills, lumber mills, chemical works, iron foundry, and manufactures carriages, wagons and harness. It is an important horse and mule, and cotton market. E.H.H.

AMESBURY, *amz' ber i,* MASS., an old city in the extreme northeastern part of the state, which bears the distinction of being "the only Amesbury in the United States." It was founded in 1600, was incorporated as a city in 1666, and was named for Amesbury, an English town. Most of the inhabitants are American, and their number was 9,894 in 1910; the Federal census of 1920 showed a slight increase, to 10,036. The area is about thirteen square miles.

Amesbury is situated in Essex County, on the Merrimac River, about five miles from the sea. Boston is forty-three miles, and Lawrence eighteen miles southwest. The Boston & Maine Railroad, constructed to this point in 1852, affords good railway transportation; with thirteen daily trains, trolley lines extend to towns in all directions and to the popular beaches and summer resorts in the vicinity. An important industry is the manufacture of automobile bodies and accessories; other

prosperous enterprises include the manufacture of shoes, hats, rattan goods and carriages. Dories, power-launches and skiffs have been built at Amesbury since 1805.

Amesbury was the home of the poet Whittier from 1836 until his death, and some of his later works describe the surrounding country. Whittier Park (thirty acres), named in his honor, is one of the recreation spots of the city. Amesbury is also noted as being the birthplace of Josiah Bartlett, one of the signers of the Declaration of Independence. R.W.B.

AMETHYST, *am' e thist,* a semi-precious stone of a beautiful violet or purple color, given its name (which means *without wine*) by the Greeks because they believed that it was a sure protection against the evil effects of strong drink. It is a variety of quartz, which usually occurs in crystals, and the coloring is supposed to be due to manganese. Amethyst occurs in Siberia, India and Ceylon, and in the United States it is found in large quantities and of excellent quality around Thunder Bay on Lake Superior. The oriental amethyst, a beautiful and costly gem, is a variety of corundum. Because it makes the skin look white, amethyst is a popular stone for rings and for necklaces, the dark purple varieties being especially sought after.

AMHERST, *am' erst,* JEFFREY, Baron (1717-1797), an English soldier, whose victories over the French at Crown Point, Ticonderoga and Montreal in 1759 and 1760 won Canada for Great Britain. He entered the army in 1731 and served in various European campaigns until Pitt promoted him from lieutenant-colonel to major-general in 1758, and gave him the command of the expedition against Louisburg, which surrendered after a short siege. In September, 1758, he became commander-in-chief of the British forces in America, and in the next year led his army to victory at Crown Point and Ticonderoga. For his services in winning Canada for Great Britain he was made Governor-General and was formally thanked by Parliament. After his return to England in 1763 he held a number of important offices, including that of absentee governor of Virginia from 1763 to 1768. From 1772 to 1795, with the exception of a single year, he acted as commander-in-chief of the British army. He was raised to the peerage in 1776 and was made field marshal in 1796.

AMHERST, *am' erst,* N. S., the county town of Cumberland, at the head of Chignecto Bay, an arm of the Bay of Fundy. Situated on the Intercolonial Railway at the narrowest point on the isthmus which connects the Nova Scotia peninsula with the mainland, it has naturally become an important center of trade and manufactures, and is the largest town in the western part of the province. It is 138 miles by rail north of Halifax, and ninety-five miles northeast of Saint John, N. B. Population in 1911, 8,973; in 1921, 9,975.

Industrially Amherst is of great importance. The neighborhood supplies coal, lumber and agricultural produce in large amounts, and also some gypsum. Boots and shoes, woolen goods, cars, malleable iron, engines and boilers, leather and wood products, including trunks, pianos, caskets and carriages, are the principal manufactures.

AMHERST, COLLEGE, at Amherst, Mass., one of the foremost of the smaller colleges in the United States. Though its faculty numbers only about fifty-five and its student body averages 500 to 550, its high standards are conspicuous, and from its foundation it has consistently aimed to be a small college of the best type. Fraternities play an important part in the student life, practically every undergraduate being a member of a fraternity.

During its early years Amherst had a hard struggle for existence, but the college is singularly fortunate in its location. The town of Amherst, twenty-three miles north of Springfield, lies in the beautiful Connecticut Valley, within sight of Mount Holyoke. Here the earnest Presbyterians and Congregationalists of western Massachusetts founded an academy in 1815, six years later changing it to a college. Here also is the State Agricultural College, opened in 1867, and not far away are Smith College and Mount Holyoke College. Population of the town in 1910, 5,112.

AMHERSTBURG, *am' erst burg,* ONT., popularly called "The Burg," a town in Essex County, on the eastern bank of the Detroit River, seventeen miles south of Windsor and eighteen miles south of Detroit. It has steamship and rail (Michigan Central) connection with both cities, and is also the terminus of an electric railway running from Windsor through Sandwich, the county town. It is the center of a prosperous agricultural section noted for its production of corn, tobacco, fruits and hogs, and there are limestone quarries a short distance from the town. A grist mill, knitting factory and several lumber yards are noteworthy. Amherstburg, one of the old-

est settlements in Ontario, was founded in 1781, and was named in honor of Baron Jeffrey Amherst (which see), then commander-in-chief of the British army. Population in 1921, 2,769. J.J.A.

AMIENS, *ah' myaN'*, a city of France, capital of the department of Somme, situated on the Somme River, eighty-one miles north of Paris. Peter the Hermit, who set Europe aflame with the spirit which led to the Crusades, was born here. The most noted building was the cathedral, the largest ecclesiastical structure in France, with a spire 360 feet high, and considered one of the finest examples of Gothic architecture in Europe. It was begun in 1220 and required nearly seventy years for completion. This magnificent structure was a mass of ruins before the close of the War of the Nations. Amiens was captured without damage by the Germans within a month of the beginning of the war, but evacuated by them thirteen days later. Later during the progress of the war the town lay within the range of gunfire for months at a time, and suffered incredible damage; the Germans never again entered the town, though they made many attempts to capture it, because it was an allied railroad center of vast importance for transportation of troops and supplies Population, 1921, 92,780.

AMMON, *am' on,* the national god of the

AMMON AND MUT

The greatest present-day value of this example of old Egyptian art is in the idea it conveys of ancient dress and peculiar square-lined figures, doubtless a survival of older rock carving.

ancient Egyptians, identified by the Greeks with their supreme god Zeus. In later times he was called Ammon-Re, meaning *Ammon the Sun.* At first his seat of worship was Thebes, the No-Ammon (City of Ammon) of the Old Testament. After his worship became national a celebrated temple was erected to him in the Libyan Desert. In statues Ammon is generally represented in human form, wearing a headdress from which two immense feathers rise. The ram was sacred to him. The goddess Mut was his wife.

AMMONIA, *a mo' ni a,* a colorless gas which dissolves so readily in water that it is almost always used in its liquid form, known as *aqueous ammonia* or *spirits of hartshorn.* This latter name, the oldest one, it received because it was long ago made by heating in a closed vessel the horns of stags or harts. Many decaying animal substances give off ammonia gas, and at such places as stockyards much of the refuse matter, as bones, hoofs and horns, is used in making ammonia. In Scotland it is obtained as a by-product in making petroleum from oil shale. By far the larger quantity, however, is obtained as a by-product in the making of gas from coal. Ammonia has qualities which readily distinguish it from other gases. First, there is its sharp, stinging odor; a strong inhalation will bring tears to the eyes. Then too, it is an alkali (which see), and as such has a decided value in restoring color to fabrics which have acids spilled on them. For this purpose it has the great advantage over the alkalies in that if more is put on than is necessary to neutralize the acid, the excess of ammonia will quickly pass into the air.

The uses of ammonia are many and important. Combined with various acids it forms salts which are of value for many purposes, while in its free form it is used in the manufacture of artificial ice (see below) and of soda. Aqueous ammonia is used in the household. Ammonia contains the elements nitrogen and hydrogen. The former makes it of value to the soil, and it is therefore employed as a fertilizer, generally as sulphate of ammonia. *Ammonium nitrate,* or nitrate of ammonia, is extensively used in the manufacture of explosives. *Ammonia chloride,* or sal ammonia, is used in calico dyeing and in cleaning metals before soldering or galvanizing. It is also used in some types of electric batteries. When reduced to a temperature of —34° C. ammonia becomes a liquid instead of a gas, and in turning back to a gas again it absorbs from the air or any other substances about it a great deal of heat. For this reason it is of the greatest importance

in the business of cold storage and in the making of ice. See ICE, subhead *Artificial Ice.*

As already noted, ammonia is a compound of nitrogen with hydrogen. Nitrogen is the most abundant constituent of the air. It is not very difficult to separate atmospheric nitrogen from oxygen, the other chief constituent. Hydrogen also can be made without much expense. Recently it has been found possible to combine the elements nitrogen and hydrogen to form ammonia. This is done by mixing the two gases, one volume of nitrogen to three of hydrogen, putting on a very high pressure and heating almost to redness. This process is called the synthesis of ammonia—synthesis meaning *putting together.* J.F.S.

AMMUNITION, *am yu' nish un,* a comprehensive term used to describe all that is necessary for firing guns of all sizes. Armies in the field are supplied with what is called *fixed ammunition* for use with machine guns, small cannon, rifles, carbines, revolvers and pistols. This ammunition consists of a cartridge made of drawn brass with a charge of some explosive and a bullet or shell. Being in one piece, it is easily handled and rapid fire can be maintained. Field artillery firing shells of more than 4-inch caliber is supplied with ammunition in which the explosive propellant and the shell are loaded separately. A modern howitzer fires a shell weighing as much as 2,800 pounds, and special mechanical contrivances are necessary to hoist the shell into the breech of the gun. The powder is loaded separately, in cloth bags which are placed in a brass cartridge, after the shell has been forced into place. Such big guns can fire not more than two shots per minute. Lighter artillery firing shells weighing twelve or eighteen pounds may discharge six or eight shells per minute.

Explosives. There are a great number of explosives used in ammunition, and though all are based on the same principles, no two armies use exactly the same formula. Lyddite, cordite, melinite and maximite are among the most powerful used, and, so keen is the desire among nations to possess the most deadly destroyer, constant improvements are being made and fresh discoveries announced. All shells of more than one pound in weight fired from big guns are explosive. Each shell contains a charge of powder which causes the shell to burst, by means of a time fuse, at a certain distance from the gun, or on striking any object in its flight. In the War of the Nations a very high percentage of wounds was inflicted by "shrapnel" shell, the most destructive form of projectile yet invented. It consists of a metal base, containing a charge of powder, and from 350 to 700 bullets, according to its size. The shell is burst by the charge and the bullets are released, plunging forward and spreading with terrific force.

Modern Bullets. The modern rifle bullet is made of a core of lead, covered with a coat of nickel or steel. It is oval in shape and has rather a sharp point. Each soldier in the field carries 100 cartridges, his store being replenished from ammunition carts which follow the troops into action. The effective range of modern rifles is about 3,000 yards, or nearly two miles, while big guns will send a shell weighing considerably more than a ton a distance of from seventeen to twenty miles. In the War of the Nations the Germans possessed one style of great gun with a range of twenty-six miles. Cartridges of the highest type for shot guns are made of brass or paper and brass and loaded with a smokeless powder and a charge of pellets or shot varying in size according to the game to be hunted. Cartridges for sporting rifles are similar to those used by the military, but the bullet is usually heavier in order to kill big game.

Naval Ammunition. Ammunition used in naval warfare differs from that used on land in that the object aimed at is the destruction of ships rather than men. The shells fired are therefore designed to pierce the armor of the vessel and sink or disable it. Naval guns of 12- and 15-inch caliber are used by big vessels, firing shells with hardened steel points. The effective range for such shells is as great as eight to ten miles. The War of the Nations brought into greater prominence than ever before in the history of the world the destructive value of the torpedo, a cigar-shaped cylinder containing a charge of powerful explosive which is discharged by percussion on coming in contact with a vessel (see TORPEDO).

There have been many international conferences concerning ammunition that may or may not be used in warfare. A certain amount of humanity may be exercised even in war, and it is generally considered that it is not necessary to mutilate men in order to put them out of a fight. Hence the use of expansive bullets, called *dum-dum* bullets, which flatten on impact and inflict a terrible wound, has been universally condemned. Supplying modern armies with ammunition is one of the greatest problems of war, for the expenditure of shells is enormous. The German armies before Lem-

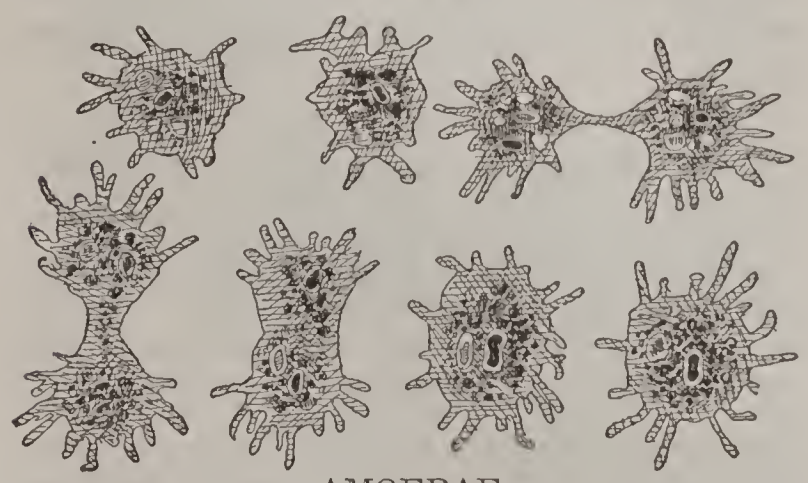
berg sent more than a quarter of a million shells into the Russian positions in twenty-four hours. L.R.G.

The guns which demand the ammunition described above, from the rapid-firing machine guns to the terribly-destructive howitzers, are described under the title ARTILLERY.

AMNESTY, *am' nes ti,* a term taken from the Greek word for *forgetfulness,* used in English with much the same meaning, though in a very special sense which implies both forgiving and forgetting. When a number of people have taken part in wrong-doing against a government, and the government feels that they have been punished enough or should be spared punishment altogether, it proclaims an amnesty, or act of forgetfulness, which makes the wrong-doing as if it had never been. Sometimes there are conditions attached which must be observed, but more often the pardon is free. Thus in 1863 President Lincoln issued a proclamation of amnesty, offering forgiveness to those who had been engaged in the War of Secession if they would swear to support the United States government; but in 1868 President Johnson issued another proclamation, which pardoned all without making them take such an oath.

AMOEBA, *a me' ba,* the name of an animal that belongs to the lowest division of the animal kingdom, the Protozoa (which see). It is composed of only one cell and on this account it has been an interesting subject of study for men of science. It affords a splendid way of studying the structure of the cell and some of the processes that go on in a living cell. For the same kind of cell structure is found also in higher animals. See CELL.

The amoeba is very small, being only about one hundredth part of an inch in diameter, and can be seen only by the aid of a microscope.



AMOEBAE

It lies in shallow waters, either fresh or salt. It appears as a shapeless, naked mass of protoplasm (which see), between whose particles are tiny spaces filled with water. In the center of it is a small brown mass which is a little denser and darker than the rest and which is the nucleus of the cell.

When observed under the microscope an amoeba is seen to be constantly moving. The movement is accomplished in a peculiar way. It sends out in various parts of the body little finger-like projections called *pseudopodia* (which means *false feet*). It then pushes forward these projections in some parts of the body and retracts those in the opposite parts. Cells which have the peculiarity of moving in the same way are called *amoeboid.* Such cells are the white corpuscles in the blood of human beings.

When an amoeba has reached a certain size it divides into two. This division starts first in the nucleus and then in the other mass of protoplasm, until it forms two amoebae.

AMOY, *a moi',* one of the five Chinese ports thrown open to foreign commerce by a treaty between England and China in 1842. It is situated on the island of the same name, to the west of Formosa, at the mouth of the Kelung River. It has an excellent harbor and was formerly the center of the tea trade of China. The tea that was sunk in Boston harbor in 1773 came from Amoy, and all the tea grown in the island of Formosa was sent there for reshipment until the harbor of Kelung assumed importance. Considerable commerce is still carried on, however, the principal imports being opium, cotton, indigo and grain; the chief exports, tea, camphor, sugar, paper and earthenware. The business section is well built with good docks, warehouses and office buildings, but the native quarter is squalid and unhealthful. Flourishing mission stations have long been maintained in Amoy, where the animosity against the "foreign devils," as all Europeans are called, is not so strong as in the interior of the country.

In the seventeenth century the Portuguese traded considerably with Amoy, but they were driven out on account of cruelty and debauchery. The British captured the town in 1841 and compelled the Chinese to grant trading facilities. Population in 1919 (postal report), 400,000, of whom only 300 were Europeans.

AMPERE, *am pehr',* the unit of strength or intensity of an electric current. An electric current is frequently compared to a current of water, but there is one important difference. Water can be measured in gallons, and the strength of its current can be actually seen as the water flows. Electricity, however, is in-

visible, and the only way to measure it is by what it does. If a current of electricity is passed through a solution which contains a metal, the electricity decomposes the solution and deposits the metal as a solid. This process is *electrolysis,* and the unit of strength of the electric current is the *ampere.* A current with a strength of one ampere will deposit, under normal conditions, 0.001118 grammes of silver or 0.0003287 grammes of copper in one second. By Ohm's Law the strength of a current is the initial force divided by the resistance it overcomes in doing its work; expressed in quantities, amperes equal volts divided by ohms. Thus the ampere is the unit of any electric current, no matter for what purpose it may be used. The instrument for measuring the number of amperes is really an ampere-meter, commonly shortened to *ammeter.* It is really a form of galvanometer (see GALVANOMETER). The reader is advised to read the articles ELECTRICITY, ELECTROLYSIS and OHM'S LAW before making any further attempt to study the details of this subject.

The ampere is named in honor of André Marie Ampére (1775-1836), a great French physicist, who proved the identity of magnetism and electricity and investigated the subject of electric currents. He first stated two simple laws which form the basis of modern electrical practice: (1) two parallel currents having the same direction attract each other; (2) two parallel currents having opposite directions repel each other. He also invented a form of needle which made possible the galvanometer.

AMPHIBIANS, *am fib' e anz,* a group of creeping or leaping, cold-blooded animals which hatch from eggs and breathe at first by means of gills, and afterwards partly or wholly by means of lungs. *Amphibian* is from a Greek word meaning *having a double life,* and is given to these animals because they can live both on the land and in water. In all stages of growth, however, it is necessary that they have moisture.

Amphibians are divided into two classes: the tailless, containing toads and frogs, and the tailed, containing newts and salamanders. The eggs are laid in fresh water streams and ponds, and the young are called tadpoles. Amphibians belong to that class of animals having a backbone, the whole class being called vertebrates. This word means *backboned animals.*

Related Topics. For a detailed description of the more important members of this order, as well as for illustrative material, consult the following articles:

Bullfrog	Salamander
Frog	Tadpole
Horned Toad	Toad
Mud Puppy	Tree Frog
Newt	

AMPUTATION, *am pu ta' shun,* in surgery, is the separation of a limb or other part from the body. If an arm or a leg is to be amputated the bone must first be laid bare by a deep cut in the flesh. This cut should be made in a slanting direction, so as to leave one or more flaps of flesh. The ends of the blood vessels must be tied, to prevent bleeding to death, and then when the bone has been sawed off the flaps may be held smoothly over the stump and stitched in place. Amputation is usually necessary in case of severe accidents or malignant growths, and always in case of gangrene poisoning. The advance of medical science, however, has made it possible in many cases to save a leg or arm which, under similar conditions a century ago, would have been removed without hesitation.

Amputation, while recognized as a serious operation, is seldom dangerous to life. It has been practised from very early times, but almost until our own days the percentage of deaths from bleeding or blood-poisoning was very large. It was in the seventeenth century that surgeons learned how to stop bleeding by the use of ligatures and tourniquets, but it was not until the nineteenth century that they learned how to prevent infection. See SURGERY.

AMSTERDAM, *am' stur dam,* Holland's metropolis and one of the chief commercial cities of Europe, famous for its art treasures and as the center of the diamond cutting industry of the world. The name means the *dam of the Anstel,* the river which flows through the city. On account of the lowness of its site, the greater part is built on piles and it is divided into about ninety islands by numerous canals crossed by nearly 300 bridges. The harbor, formed by the Y or Ij, an arm of the Zuyder Zee, lies along the whole north side of the city and is surrounded by various docks and basins. A ship canal fifteen miles long and twenty-two to twenty-six feet deep connects the Y with the North Sea, and the city is joined to Helder, commanding the entrance to the Zuyder Zee, by the North Holland Canal, forty-six miles in length.

Among the principal buildings in Amsterdam are the palace, originally built as a town hall, the Stadthuis, the Bourse, the Rijks Museum or

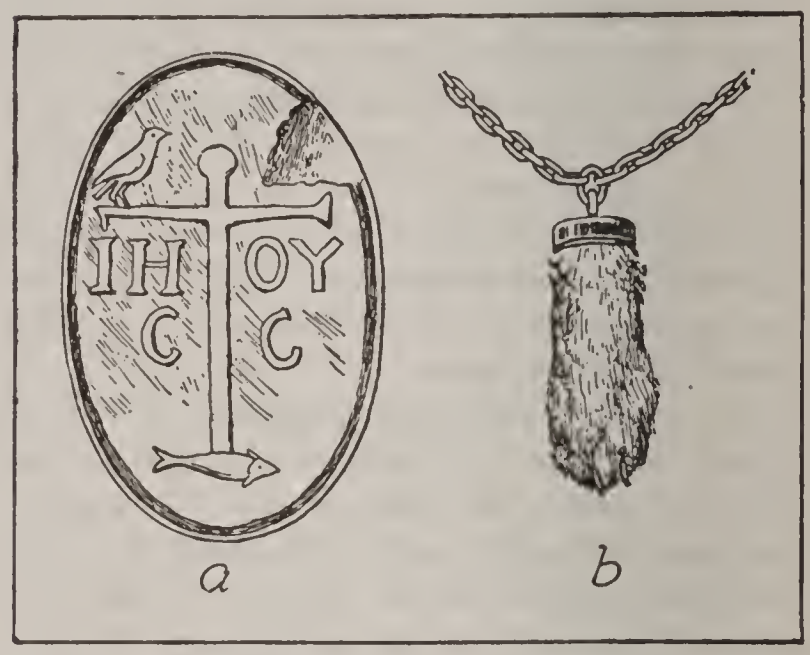
States Museum, and the New Church, in which the sovereigns of Holland are crowned. The palace belongs to the city, and when the Queen is in residence there, she is literally a guest of the city. In the States Museum is a wonderful collection of pictures by artists of the Flemish and Dutch schools, and there are several other collections of great value, making Amsterdam one of the great art centers of the world; it is particularly famous for its Rembrandt's, for it was here that the great painter lived. There are also many educational institutions, including two universities, colleges, hospitals and homes for the aged, poor, blind and infirm, supported chiefly by voluntary contributions.

The most important industry is diamond cutting, for which Amsterdam has been noted since the fifteenth century. Diamonds were introduced into Europe at a time when the Dutch controlled the oversea commerce of the world, and naturally found their way first to Amsterdam. In the Jewish quarter of the city the cutting industry sprang up and the supremacy of its diamond cutters has never been disputed. Other industries include the manufacture of tobacco, glass, soap, jewelry, linen, silk and machinery, but the city is of more importance as a trading than as a manufacturing center. During the days of Napoleon's power the trade of Amsterdam suffered considerably from its forced alliance with France, but since the fall of the emperor it has steadily increased. Population, 1920, 642,162.

AMSTERDAM, N. Y., a manufacturing city in the famed Mohawk Valley, in the eastern part of the state, about midway between its northern and southern borders. Troy and Albany are thirty-four miles southeast, and Utica is fifty-two miles northwest. It is situated in Montgomery Co., on the Mohawk River and on the Erie Canal, and is served by the New York Central and West Shore railroads. Trolley lines afford communication with neighboring towns. The population is largely American; it was 31,627 in 1910; the Federal census of 1920 increased this to 33,524. Amsterdam was known as Veedersburg from the time it was settled in 1778 until 1804, when the present name was adopted. It was incorporated as a village in 1830 and as a city in 1885. The area is nearly five and one-half square miles.

Of the city's varied products, carpets and rugs rank first, although its output of pearl buttons is claimed to be the largest in the world. There are also extensive manufactures of knit goods, wagon-springs, paper, silk and brooms. The annual output of the half hundred factories is $25,000,000. Amsterdam has a Children's Home, a home for elderly women, an Elk's Home and two hospitals. A good public school system, two business colleges, Saint Mary's Catholic Institute and a Carnegie Library supply the educational needs. Two large parks on the outskirts of the city provide recreation grounds. R.N.B.

AM'ULET, an object usually of stone, metal or animal skin, with or without figures and words, and worn by superstitious people as a charm to ward off sickness, ill fortune, witchcraft, etc. Relics of the saints and herbs and



(*a*) A medieval amulet.
(*b*) The rabbit's-foot amulet worn by many superstitious people. (See SUPERSTITION.)

precious gems have also been used, and the Mohammedans use a tiny copy of the Koran, hung round the neck, as an amulet. The peoples of Asia have from ancient times believed in these charms, and still have great faith in their powers. The use of amulets was early forbidden by the Christian Church. See TALISMAN.

AMUNDSEN, *ah' mun sen,* ROALD (1872-), the discoverer of the South Pole, one of the most careful and successful explorers of modern times. His great voyage was begun in 1910, when he set out from Norway in Nansen's ship, the *Fram,* intending to drift for several years across the Arctic seas; but shortly after sail-

ROALD AMUNDSEN
The discoverer of the South Pole.

ing he changed his plans and headed for the Antarctic regions. Arriving in January, 1911, at the far southern land mass, he determined to set up his camp on the great ice barrier, which had always seemed impassible. Supplies for nine men for two years, together with building material, were hauled to the top of the ice cap, and there was built *Framheim,* his headquarters.

With the aid of Eskimo dogs and sledges, three provision depots were established farther south, and with the coming on of the southern winter, men and dogs settled themselves at Framheim. When the weather broke in October, 1911, Amundsen, with four companions, fifty-two dogs and four sledges, set out for the south over the ice. Latterly they traveled across a plateau 11,000 feet in height, and crossed some very dangerous crevasses, but on December 16 all their hardships were repaid when observations showed that they had reached the South Pole. There Amundsen set up a small tent, with the Norwegian flag floating above it, and it was these landmarks which Scott encountered a month later.

This voyage of Amundsen was merely the climax of a life largely spent in explorations. He was born at Christiania, Norway, studied for the navy, and in 1897 went on his first Antarctic exploring trip as first mate of the *Belgica.* It was in 1903 that he undertook his first independent expedition, which had two objects: the locating of the north magnetic pole and the discovery of the Northwest Passage, which had been sought since the sixteenth century. After making observations from which scientists afterward worked out the location of the magnetic pole, he pushed from the Atlantic into the Pacific through Bering Strait; and the Northwest Passage (which see) was found. In 1922 he began another scientific expedition, to extend through several years.

Amundsen's character is noteworthy for its modesty. In his lectures on his great achievement he can hold his audience for hours entranced with interesting and instructive tales of the "farthest south," without once mentioning himself. His narrative has appeared in book form as *The South Pole.* See POLAR EXPLORATION; SCOTT, ROBERT FALCON.

AMUR, or **AMOOR,** *ah moor',* the river which separates Manchuria from Eastern Siberia, then turns north and discharges into the ocean behind Saghalien Island, a few miles from the Sea of Okhotsk. It is formed by the junction of the Argun and Shilka rivers, a few hundred miles east of Lake Baikal. It is the most important stream flowing to the Pacific north of the Yellow River of China.

The Amur is an important river in commerce. Though its mouths are so choked with sand that goods must be transported by rail for nine miles, it is navigable in a great part of its 2,680 miles of length, from April to November. Khaborovsk, at the point where the river turns north, has rail communication with the port of Vladivostok and the Trans-Siberian railroad.

The river has four important tributaries, the Sungari and Ussuri on the south, and the Seya and Bureya on the north. Its basin includes about 772,000 square miles.

AMUSEMENTS. It is not only the children who need play or other relaxation to keep them physically and mentally fit; grown people, those who give up most of their time to work, are dependent no less upon some form of recreation. The man whose work is monotonous and deadening needs it to invigorate his mind; the student or the man of large affairs needs it as a mental rest, as a let-down to a mind too tensely keyed.

There is thus a valid reason for many of the amusements or recreations which have been devised in almost infinite number, for different people demand different kinds of recreation. One man delights in games of skill in which he himself may take a part, and a wide choice awaits him—he may "relax" with golf or with tennis, with chess or with whist. Another prefers to watch the skilful moves of others; he spends his summer afternoons at the baseball grounds, or his evenings at the vaudeville, where graceful dancing is to be seen. The man who devises a popular amusement has found a sure way of attracting money to his pockets, for the majority of people are more willing to spend money for their recreation than for any other purpose.

Related Topics. A glance at the following list will show something of the number and variety of amusements popular to-day or in some past time. Each topic is given detailed treatment in its alphabetical order in these volumes. In the article GAMES AND PLAYS, also, are discussed numerous types of games for children.

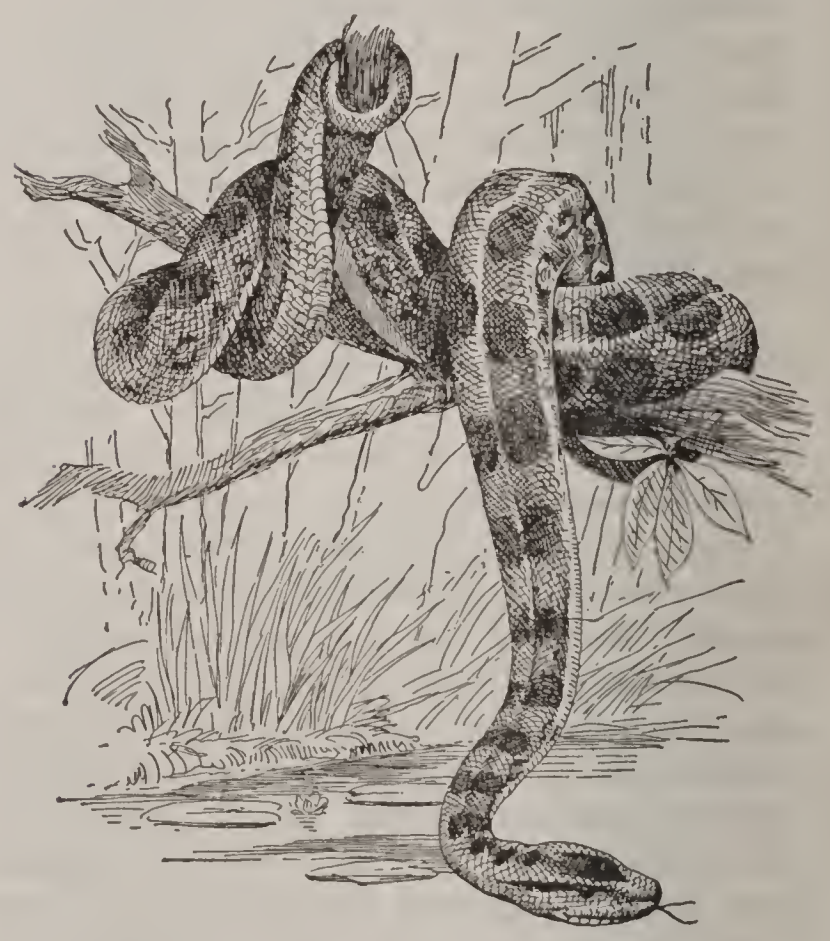
Acrostic
Anagram
Angling
Archery
Athletics
Backgammon
Bagatelle
Ballet
Baseball
Baseball, Indoor
Basket Ball
Battledore and Shuttlecock
Billiards
Bowling
Boxing
Bridge
Bullfighting

Calisthenics
Camp
Canoe and Canoeing
Cards, Playing
Carnival
Casino
Charade
Checkers
Chess
Circus
Coasting
Cockfighting
Cribbage
Cricket
Croquet
Curling
Dancing
Delsarte System
Dice
Discus, Throwing the
Dominoes
Dumb-bells
Euchre
Fandango
Fencing
Ferris Wheel
Fives
Football
Football, Association
Games and Plays
Golf
Gymnastics
Hammer, Throwing the
Hand Ball
Harlequin
Hippodrome
Hockey
Hop Scotch
Hunting
Hurdling
Ice Yachting
Jackstones
Jackstraws
Jiu-Jitsu
Kites
Lacrosse
Lawn Tennis
Legerdemain
Marbles
Moving Picture
Pantomime
Ping Pong
Piquet
Play
Pole Vault
Polo
Pool
Prize-fighting
Quadrille
Quoits
Race
Riding
Rouge-et-Noir
Roulette
Rounders
Rowing
Shot, Putting the
Shuffleboard
Skat
Skates and Skating
Ski
Snowshoe
Solitaire
Swimming
Target
Tennis
Theater
Tobogganing
Top
Tournament
Trawling
Trolling
Vaudeville
Waltz
War Game
Whist
Wrestling
Yacht and Yachting

ANABAPTISTS, *an a bap' tists,* a Christian body of Reformation days, who did not believe in infant baptism, and therefore newly baptized all who joined them. Those outside the group regarded this as a second baptism and called them Anabaptists, or "rebaptizers." They were most active in Switzerland, Germany and the Netherlands, and about 1532 they set up in the German city of Münster, Westphalia, the "kingdom of the New Zion." The city became the scene of cruelty, fanaticism and crime, and in 1535 was taken by the Protestant princes. The leaders of the sect were cruelly tortured and then killed, and the Anabaptists do not appear again in history as a distinct body. The modern Baptists are the most important of the religious bodies that reject infant baptism. See BAPTISTS.

ANABASIS, *a nab' a sis,* the name of two famous Greek histories. The first and best known is Xenophon's absorbing story of the campaigns of the Greek mercenaries of Cyrus the Younger against Artaxerxes, the Persian king, his brother, and of the fighting retreat of the 10,000 Greeks, under Xenophon's leadership, from Persia to the Black Sea through Armenia. The other story is Arrian's chronicle of Alexander the Great. See XENOPHON.

ANACONDA, *an a kon' da,* a giant snake belonging to the boa-constrictor family, which inhabits the swamps and rivers of the dense South American forests, chiefly of Brazil and Peru. The largest of all snakes, it grows to a length of from thirty to forty feet. The anaconda is of a dark olive-brown color, with large, oval, black spots along the back, and smaller white spots along the sides. It can climb trees, and is often to be found coiled around a branch



THE ANACONDA
This characteristic pose suggests its great strength.

waiting for its prey. This snake is also a water animal, and its habit of lying in the streams, with only a small part of the head above the surface, has given it the local name of water-boa. It feeds on birds, fish, monkeys and other animals, and is said to attack human beings when hungry. It has no poison fangs, but kills its prey by crushing it and then swallows it whole. In a wild state anacondas are known to live comfortably a month or even longer without eating, because they usually gorge themselves at a single feeding. In zoölogical gardens where small animals are given them, they are fed about once a week. The ana-

conda is the only large boa which has a vicious temper. See Boa; Python.

ANACONDA, Mont., a city of rapid growth, famed for the largest copper-smelting industry in the world. The population, chiefly American, includes also Irish, English, Austrians and Croatians; the people in 1910 numbered 10,134; in 1920 the city had increased to 11,668. It is the county seat of Deer Lodge County, in the southwestern part of the state, on Warm Springs Creek, about twenty-six miles northwest of Butte and about sixty-five miles southwest of Helena. Railway accomodations are afforded by the Butte, Anaconda & Pacific Railway, which connects with the Northern Pacific, the Great Northern, the Chicago, Milwaukee & Saint Paul railways and the Oregon Short Line of the Union Pacific Railway. Anaconda was only a small mining camp in 1880, it was incorporated as a city in 1889 and received its name from the famous Anaconda copper and silver mine, located at Butte. The area is about one square mile.

The rapid growth of Anaconda is due to the founding of its great copper-smelting industry. The Washoe Reduction Works employ 3,500 men, the payroll amounts to $450,000 monthly; about 16,000 tons of ore are treated every twenty-four hours. These works produce about ten per cent of the world's output of copper. There are also large railroad shops, machine shops, brick works and other manufactories. The value of manufactures in 1920 was nearly $1,500,000, an increase of 100% in ten years. The city maintains a public library, the gift of Mrs. Phoebe Hearst. The Montana Hotel, erected at a cost of $100,000, the Daly School of Gymnastics and Domestic Science, which cost $60,000, Saint Ann's Hospital and two banks are the notable buildings. Four playgrounds and a baseball park that becomes a free skating rink in winter are maintained by public subscription. At Anaconda is located The Montana State Fish Hatchery, which supplies trout, grayling and white fish for restocking the streams and lakes of the state. Georgetown Lake, Silver Lake and the surrounding mountains form the scenic beauty of Anaconda. Deposits of graphite, silver, gold and sapphires are found in the vicinity. F.W.W.

ANAEMIA, *a ne' mi a,* a condition characterized by lack of some important part of the blood. It is of two kinds, *primary,* or *pernicious* anaemia, and *secondary* anaemia. In the former, the cause of which is unknown, there is a great decrease in the number of red blood cells. The victim of this condition has a very bad outlook and should be under the care of a skilled physician. In secondary anaemia the chief deficiency is in the coloring matter of the blood. This condition yields more or less readily to treatment. The best cure is natural living—a diet consisting largely of grains, milk, fruit, vegetables, eggs and a small amount of meat; exercise in the open air; and about eight hours of sleep a day in a well-ventilated room or out-of-doors. Tonics containing iron are often helpful, but these should be prescribed by a physician.

ANAESTHETIC, *an es thet' ik,* the classical form of Anesthetic (which see).

ANA ' GRAM, from two Greek words meaning *backward writing,* is the name given a word or words made by changing the order of the letters of another word, phrase or sentence, so as to form an expression which has a different meaning. For example, the letters of *French Revolution* may be arranged to form the phrase "Violence run forth." This is a good anagram because it contains the exact letters of the original expression, and is at the same time an apt description of the Revolution.

The making of anagrams was invented by the ancients, and was a popular exercise among the Jews, Greeks and Romans. The Europeans of the Middle Ages particularly enjoyed this amusement, and in more recent times literary men of note have felt it not beneath their dignity to form pen names out of the letters of their real names, though John Dryden called this "the torturing of one poor word ten thousand ways." Barry Cornwall, poet, is the anagram for Bryan Waller Proctor, and Voltaire is formed from the family name of that French author. One of the best anagrams ever made was formed from the letters in the name of Horatio Nelson, the English hero of the Battle of the Nile—"Honor est a Nilo," a Latin sentence meaning "Honor is from the Nile." Anagram making is a good mental exercise, and may be recommended as an interesting pastime for those fond of solving puzzles.

ANALYSIS, *a nal' i sis,* a word derived from the Greek, and literally meaning to *unloosen* or *unravel,* and also *to break up into parts.* The term is used in grammar, philosophy, mathematics and chemistry.

In Grammar. Analysis is the breaking-up of a sentence into its parts, such as subject, verb, object and modifiers, with the purpose of show-

ing how the sentence is constructed and what function is performed by each word and phrase. Analysis becomes a familiar process to every child in school and is the first step in parsing a sentence. The points to be covered are the classification of the sentence; independent and dependent clauses separately treated with reference to complete subject and predicate, simple subject and predicate, and modifiers of each.

Type Sentence Analyzed. "We think in words, and when we lack fit words we lack fit thoughts."

Classification: Compound, complex, declarative sentence.

First independent clause, *We think in words.*

Second independent clause, *When we lack fit words* we lack fit thoughts.

The two independent clauses are connected by the coördinate conjunction *and.*

First independent clause: Complete subject, *we;* complete predicate, *think in words.* Simple subject, the personal pronoun *we,* unmodified; simple predicate, the intransitive verb *think;* modified by the adverbial phrase of manner, *in words, words* being the object of the preposition *in.*

Second independent clause: Complete subject, *we;* complete predicate, *lack fit thoughts when we lack fit words.* Simple subject, the personal pronoun *we,* unmodified; simple predicate, the transitive verb *lack,* modified by the adverbial clause of time, *when we lack fit words,* and completed by its object *thoughts,* modified by the descriptive adjective *fit.*

Dependent clause: Introduced by the adverbial conjunction of time *when.* Complete subject, *we;* complete predicate, *lack fit words.* Simple subject, the personal pronoun *we;* simple predicate, the transitive verb *lack,* completed by its object *words,* modified by the descriptive adjective *fit.*

Analysis is frequently recorded graphically by means of a diagram. See SENTENCE, subhead *Diagram of a Sentence.*

In Philosophy. If we study a subject by recognizing its characteristics, we are analyzing. Consider, for example, glass. It is hard, transparent, thin and easily breakable; sand is an important element in its manufacture. This is analysis, that is, distinguishing the parts or characteristics of a subject. The same process may be applied to any subject under discussion. The opposite is *synthesis;* for example, we may say that this substance is hard, transparent and easily breakable—therefore it is glass (see SYNTHESIS).

In Mathematics. Euclid says that "analysis is the obtaining of the thing sought by assuming it and so reasoning up to an admitted truth." Analysis is of little importance in elementary mathematics, all of which is done by reasoning from the known to the unknown. Originally all propositions in geometry, for example, were solved by analysis, but now the method employed is to work from an axiom, or known truth, to a new and more specific application. Algebra is partly, as least, analytic, for the solution of an algebraic equation means that unknown quantities become known.

In Chemistry. Chemical analysis is the process of separating a compound into its parts. If this process is to determine what elements the compound contains, it is *qualitative analysis;* if it is to determine how much of each element is present, it is *quantitative analysis.* Thus by the first process we learn that water is a compound of hydrogen and oxygen, and by the second that it consists of one part of hydrogen by weight to eight parts of oxygen, or one part of oxygen by volume to two parts of hydrogen; because of these proportions by volume, the chemical symbol for water is H_2O. If the analysis shows the elements and the quantities in which they are present the analysis is said to be *ultimate,* that is, *final.* The chemist, however, may go farther and try to determine in what combinations the elements are present, and what their condition is with respect to the formation of combinations. This is called *proximate analysis.* See CHEMISTRY; also SPECTRUM ANALYSIS.

E.D.F.

ANAM. See ANNAM.

ANANIAS, *an a ni' as,* a Bible character whose name has come to be used as a synonym for the word *liar.* He was a member of the early Church at Jerusalem, and with his wife Sapphira was struck dead for having pretended that he was bringing the whole price of his newly sold land to the Church treasury, when in reality he was keeping part for his own use (*Acts* V, 1-10).

ANARCHISM, *an' ar kizm,* a philosophy or theory of life which would free the individual from every form of restraint or compulsion whether political, religious or social. Unfortunately this theory has sometimes led to violence and murder. Men of weak intellect, unable to see that the death of a king or a president could not change the social order, have murdered rulers and paid the penalty with their own lives. In popular language, therefore, anarchism is almost synonymous with disorder of every kind. But the philosophical anarchist refuses to acknowledge any connection with men who resort to crime in their attempts to overthrow the present form of

society. To him anarchy is the perfect social order, in which every human act is voluntary.

Anarchism vs. Socialism. Anarchism is sometimes called a form of socialism, and anarchists and socialists are wrongly classed together as undesirable citizens. Only in one respect are anarchism and socialism alike—both demand the abolition of private property, especially the means of production. Both believe that at some time in the future all production will be carried on for the benefit of those who are actually working to produce. The socialist believes that this condition will arise when all industry is controlled by the state, which is the expression of the popular will. The anarchist, on the other hand, believes that production will be carried on by groups of people working in coöperation, because it is to their individual interests and because they want to work together.

Politically, anarchism and socialism are far apart. Socialism, it is claimed, would decrease the importance of the judicial powers of the state, because it would abolish private property. Socialists say that most of the civil and criminal cases tried in the courts arise from private property. The administrative powers, on the other hand, would be greatly increased, for the state would control all industry and regulate the functions and privileges of the individual. This system is as hateful to the anarchist as the existing capitalist form of organization. The anarchist believes that the power of the state is not to be preferred to the power of capital. Either system destroys the perfect liberty of the individual; therefore it is wrong.

The philosophy of anarchism has made less progress in America than in Europe. Its principles are represented to some extent, however, by the Industrial Workers of the World (see that title, page 6470).

ANATOMY, *a nat' o mi.* This word, which comes from the Greek, means *to cut apart,* and is the name of that science which treats of the structure of animals and plants; that is, it deals with the knowledge gained by dissecting, or *cutting apart.* Its two great branches are *plant anatomy,* and *animal anatomy,* and each of these has several divisions, according to the methods used or the purposes men have in view.

Animal Anatomy. Under this heading are included animal anatomy proper, and *human anatomy,* which deals with the structure of human beings. This latter is of greatest importance, because upon it depends much of medicine and surgery, especially the latter. No surgeon would dare perform an operation if he did not know thoroughly the position and structure of the organ to be operated on. The science of human anatomy, helped out by all that has been learned of the structure of the lower animals, has reached a very high point of perfection in all the medical colleges of Europe and America. Indeed, so complete has it become that it is divided into many smaller branches; and a surgeon may make perfect his knowledge of any one of them, while having but a general knowledge of the others. Thus he becomes a specialist, and in large cities most surgeons are now specialists.

Comparative Anatomy. There is a *comparative* branch in both animal and plant anatomy. This science compares different classes of animals or plants, trying to find out all their likenesses and differences and so to discover in what ways they are related. Thus the *families* of plants and animals are determined.

History of Anatomy. In ancient times most peoples believed that the body after death was a sacred thing, and that to cut it in any way was to commit a serious crime. Thus it is not strange that before the Christian Era little was known of the way the human system was organized. The Greeks, it is true, did permit an occasional dissection, after the fifth century B. C., and Galen, in the second century A. D., made real advances in the science of anatomy, but it was not until the fourteenth and fifteenth centuries that it became clear that the art of healing could not advance far unless dissection was practised. The rulers of leading European nations ordered a certain number of dissections in the medical schools each year, and the results soon were shown in such wonderful discoveries as Harvey's tracing of the circulation of the blood. Advancement in physics, in chemistry and in botany has had great effect on the growth of the science of anatomy, and now the pupil in grammar school, with his pictures and colored drawings of the different parts of the body, knows more about the structure of that wonderful organism than the wisest of the ancient Greeks, such as Plato and Aristotle, ever dreamed of. W.F.R.

Related Subjects. The following list of articles in these volumes dealing with anatomical matters will be interesting and helpful to the reader who desires to gain a detailed knowledge

of the science. No attempt has been made to separate physiological topics from anatomical, as the two subjects are very closely related:

Abdomen
Absorption
Adhesion
Alimentary Canal
Aorta
Appetite
Arm
Arteries
Assimilation
Biceps
Bile
Bleeding
Blood
Blushing
Bone
Brain
Breath
Capillaries
Cartilage
Chest
Chyle
Chyme
Circulation
Diaphragm
Digestion
Ear
Embryo and Embryology
Eye
Face
Fat
Fatigue
Fletcherizing
Foot
Gall Bladder
Ganglion
Gastric Juice
Gills
Glands
Hair
Hand
Head
Health
Health Habits
Heart
Histology
Immunity
Intestines
Joints
Jugular Vein
Kidneys
Lachrymal Glands
Lacteals
Larynx
Life Extension
Ligament
Liver
Lungs
Lymph
Lymphatics
Mastication
Membranes
Mouth
Mucus
Muscle
Muscle Sense
Nails
Nerves
Nervous System
Nose
Nutrition
Palate
Pancreas
Pelvis
Peptones
Pericardium
Peritoneum
Perspiration
Pharynx
Pleura
Pulse
Reflex Action
Saliva
Scalp
Secretion
Senses, Special
Serous Membranes
Skeleton
Skin
Sleep
Smell
Snoring
Spinal Cord
Spleen
Starvation
Stomach
Taste
Teeth
Tendons
Thirst
Thoracic Duct
Tissues
Tongue
Tonsils
Touch
Trachea
Urine
Veins
Villi
Vision
Voice

A large number of articles on related topics will be found listed in the indexes accompanying the articles DISEASE, MEDICINE AND DRUGS, and SURGERY.

ANCESTOR, *an' ses ter,* **WORSHIP.** Certain peoples, among whom the most important are the Chinese, have so great a reverence for the dead members of their families that it really amounts to worship. Many Chinese homes to-day have little carved wooden pillars, called ancestral tablets, in which the spirits of the family ancestors are supposed to dwell; and before these tablets incense is burned by the family as before a shrine. Much of the social system of China depends on this ancestor worship, for since only a "man-child" can fittingly do homage to the spirits of his ancestors, every family hopes for sons and regards daughters as worse than useless. Ancestor worship is also common in India and among certain savage tribes, who worship the animals in which they believe their ancestors have taken refuge after death. Christianizing influences are slow to effect moral changes in such people.

Such rites appear so strange to people in highly civilized countries that we wonder what causes may be back of them. It is easily understood if we are willing to believe that all human beings realize by instinct there is some influence above the highest powers of man. This belief is indeed very real; the poet Pope expresses it in the words:

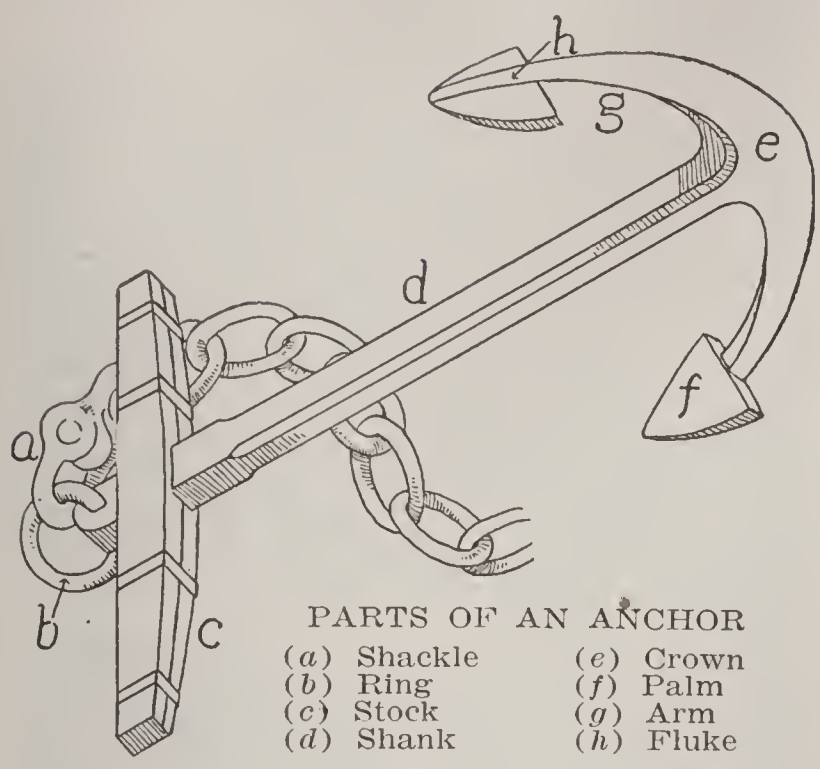
> Lo! the poor Indian, whose untutored mind
> Sees God in clouds, or hears him in the wind.

To be sure, the savage does not know that it is God he is seeking; it is just something or some one greater than himself. And who is so likely to be this greater person as the father or grandfather to whom all his life he has had to bow down? Fear enters into his worship to a great extent, too, for he believes that his father and his grandfather can punish him from the spirit world for any neglect, just as severely as they did when their bodies were on earth.

ANCHOR, *ang' ker,* an implement nearly always of iron, used to prevent a ship from drifting. It usually consists of a bar, or shank, with two arms, or *flukes,* at the lower end, a cross piece at the top and a ring to which a cable or chain is attached, for lowering it into the water. When the anchor is let go and sinks to the bed of the river or into the sea, one of the flukes is made to sink into the bottom and thus take a secure hold. In some anchors the flukes are loosely bolted to the shaft and turn on the bottom so that both take hold of the earth at once.

Merchant ships do not as a rule carry such heavy anchors as men-of-war, which are provided with two anchors, many tons in weight. A horizontal pull causes the anchor to take

a firmer hold in good ground but in loose soil it may be pulled out by the motion of the



PARTS OF AN ANCHOR

(*a*) Shackle	(*e*) Crown
(*b*) Ring	(*f*) Palm
(*c*) Stock	(*g*) Arm
(*d*) Shank	(*h*) Fluke

ship. When the anchor is *weighed,* it is hoisted to the vessel.

ANCIENT, *ayn' shent,* **MARINER,** THE, a long poem written by Samuel Taylor Coleridge, containing some of the most exquisite poetry in the English language, as well as a beautifully-stated moral, expressed in the following words:

> He prayeth best, who loveth best
> All things both great and small;
> For the dear God who loveth us,
> He made and loveth all.

It is a story poem, which tells of a sailor who in wanton sport shoots an albatross which has followed his ship, while his companions praise him for his deed. For this they are punished with death, while he meets the worse fate of having to sail "alone on a wide, wide sea," until he feels in his heart love for the moving things he sees about him on the water. Then he is released from his weight of guilt, but is doomed for the rest of his life to seek out men to whom he may tell his story. See ALBATROSS.

ANCIENT ORDER OF UNITED WORKMEN, a mutual-benefit society, organized in 1868, at Meadville, Pa. Families of deceased members receive a benefit of $2,000. The highest governing body of the society is the "supreme lodge"; this controls the "grand" or "state" lodges, and these in turn direct subordinate lodges. In 1922 the organization had a total membership of 400,000. There were forty grand lodges and 4,500 sub-lodges. Since the organization of the society over $250,000,000 has been expended in benefits.

ANCONA, *ang ko' na,* the capital of a province of the same name in Italy, and next to Venice the most important port on the Adriatic coast, as it is a harbor for the Italian fleet. It is located 185 miles northeast of Rome in an amphitheatre between two hills and is divided into two parts, the old and the new city. The Cathedral of Saint Cyriac, built in the eleventh and twelfth centuries, and a triumphal arch of Parian marble erected in honor of Trojan, are the most remarkable features of the city. Ancona was founded about four centuries before the Christian Era, and fell into the hands of the Romans in the first half of the third century B. C. Population in 1911, 63,100.

ANDERSEN, *ahn' dur sen,* HANS CHRISTIAN (1805-1875), one of the best-loved writers of children's stories, known the world over as the author of *The Ugly Duckling, The Fir Tree, The Constant Tin Soldier,* and other

HANS CHRISTIAN ANDERSEN

tales no less delightful. He was a strange man, and had in some ways a strange life. Born at Odense, in Denmark, into a poor home, he grew up with little education and almost no home training; but he acquired, through going to see every play of the traveling companies who visited his town, a great love for the theater. In 1819 he went to Copenhagen, determined to be an actor, and visited one theater after another, without success. Finally kind friends became interested in him, sent him to school, and supported him

while he began to write plays which he thought would very soon make him famous.

It was not until he began to write travel stories, however, during his journeys in Germany and Italy, that people paid any particular attention to him; and not until 1835, when his first volume of *Fairy Tales* appeared, did he really become famous. More of these tales were published from time to time, and while his other works, such as the novels called *The Improvvisatore, O. T.* and *Only a Fiddler,* and his *Life's Romance* were highly praised, it was for the charming fairy stories that grown people as well as children waited most eagerly.

It is pleasant to know that Andersen's greatness was fully acknowledged before his death, and that during his last years he had honor and happiness enough to make up for the misery of his early life. The king and queen of Denmark were proud to call him their friend, and famous people in every country loved and respected him. When he died, men, women and children all over the world were as sorrowful as if they had lost a personal friend.

His *Ugly Duckling,* probably the most famous of his stories, is given in full in the article Story Telling.

ANDERSON, Marie Antoinette (1859-), commonly called Mary Anderson, one of the most popular of American actresses. Though she retired from the stage in 1890, after a career of only fifteen years, her fame still lives and her interpretations of Juliet in *Romeo and Juliet,* and of Rosalind in *As You Like It* have rarely been equalled. She studied for the stage under the guidance of Charlotte Cushman, a famous actress, and at the age of sixteen made her debut as Juliet. Later she played Meg Merrilies in *Guy Mannering,* Perdita in *A Winter's Tale,* Galatea in W. S. Gilbert's *Pygmalion and Galatea,* and Clarice in his *Comedy and Tragedy,* written especially for her. After her marriage to Antonio de Navarro in 1890 she retired from the stage and made her home in England. In 1896 she wrote *A Few Memoirs,* and in 1911 assisted in the dramatization of *The Garden of Allah,* a novel by Robert Hichens.

ANDERSON, Ind., a railroad center and important industrial city, notable for the variety of its manufactures. The city was founded in 1822 and was incorporated in 1865; the population, chiefly American, increased from 22,476 in 1910 to 29,767 in 1920. It was first settled as the home of the Delaware Indians and was known as *Anderson's Town,* from the chief of the tribe, whose name was "Kick-tha-we-nund," or Anderson. The area is a little less than five square miles.

Anderson is situated a little to the northeast of the geographical centre of the state, on the west fork of the White River, in Madison County, of which it is the county seat. Indianapolis is thirty-six miles southwest, and Muncie is eighteen miles northeast. It is the center of one of the most extensive electric traction systems in the middle west, and has the largest power house in the state. It is the junction point of the Cleveland, Cincinnati, Chicago & Saint Louis, or Big Four Route, the Pennsylvania Line and the Central Indiana Railway.

As a manufacturing city, Anderson's importance is due to its location in a natural gas district. In its 115 factories, which employ nearly 8,500 people, almost every commodity known to trade is manufactured, and the annual output averages about $22,000,000. The Remy Electric Company, the Nicholson File Company and the American Steel and Wire Company are among the principal manufacturing industries. The surrounding district is rich in agricultural products and deposits of coal. A manual training high school, constructed in 1912 at a cost of $285,000, two business colleges and a Carnegie Library, in addition to the public school system, serve the educational interests. The city has six banks and its most notable buildings are the post office, the courthouse, erected in 1882 at a cost of $200,000, and Saint John's hospital. An interesting feature of the vicinity is the Prehistoric Mound's Park. B.F.A.

AN'DERSON, S. C., a city with a population, chiefly American, which increased from 9,654 in 1910 to 10,535 in 1920. Sixty-five per cent of the inhabitants are white. The city was founded in 1827 and was incorporated as a city in 1882. The area is about three square miles.

Anderson is the county seat of Anderson County, located in the heart of a rich agricultural section in the northwestern part of the state. Greenville is thirty-two miles northeast, and Columbia, the capital, is 126 miles southeast. The city is served by the Charleston & Western Carolina Railway and the Blue Ridge branch of the Southern Railway. There is electric railway service to points north, east and south. Anderson county ranks second in the United States in the production of cotton,

and the industries of the city are largely dependent on this product. About 4,900 people are employed in the cotton and cotton-seed oil mills. There are also fertilizer, bed-spring, lumber and mattress factories and flour mills and machine shops. Electric power is supplied by a power house ten miles distant on the Seneca River; it is owned by a private corporation. The most notable building is a $70,000 Federal building, constructed in 1913. The Anderson Female College, the Patrick Military Institute, a business college and a Carnegie Library supplement the public school system. Buena Vista Park, covering sixty acres, is the recreation spot of the city.

Anderson was the birthplace of John C. Calhoun. H.B.F.

AN'DERSONVILLE, GA., the site of a famous Confederate States military prison, in which nearly 50,000 Federal prisoners were confined during the course of the War of Secession. Over one-fourth of these succumbed to the terrible conditions of insanitation and insufficient food and shelter. After the war the superintendent, a Swiss named Henry Wirz, was tried and hanged for his persecution of the prisoners, part of the evidence against him having been secured by a Confederate medical commission. At times there were over 33,000 prisoners in the enclosure, which contained only twenty-six and a half acres, or about thirty-five square feet for each man.

The village of Andersonville contained only 174 inhabitants in 1910. It is in Sumter County, in the southwest part of the state, between Americus and Montezuma.

ANDES, *an' deez,* called in Spanish CORDILLERA DE LOS ANDES, or simply CORDILLERAS, is a great mountain system of South America, the backbone of the continent. The Andes lie on or near the west coast, and extend from Cape Horn, at the south, to the Isthmus of Panama and the Caribbean Sea, at the north. Taken as a whole, they comprise by far the highest mountain mass on earth; there are occasional breaks or divisions, but the total length of this system, 4,500 miles, far exceeds that of any other in the world. This is about 500 miles longer than the Rocky Mountains system of North America, and is more than twice the distance from London to Constantinople. The Andes have a maximum width of 500 miles, about the same as that of the Rockies.

Divisions. The Andes may be divided into three sections, the Southern, Central and Northern Andes. The Southern Andes consist of a lofty main chain, with a minor range running parallel to it on the east. They extend from Tierra del Fuego and the Straits of Magellan northward, and rise to their highest point, 22,860 feet, at the summit of Aconcagua, not far from Santiago, the capital of Chile. This is the loftiest peak on the American continent. See ACONCAGUA.

Northward lies the double chain of the Central Andes, where the mountain system is at its broadest, being about 500 miles across. Between the two great ranges are the wide, elevated plateaus of Peru and Western Bolivia. These plateaus are more than 12,000 feet above sea level. There are also several lofty peaks, among them Sorata or Illampu (21,484 feet), Sahama (21,054 feet), and Illimani (21,024 feet). Farther north the two mountain ranges draw together, the plateau becomes narrower, and finally the two parallel chains are so close together that they form one elevated mass. In this section the loftiest summit is that of Chimborazo (20,581 feet), formerly thought to be the highest in South America. Cotopaxi (19,500 feet) is another famous peak.

The Northern Andes break into three distinct ranges, none of whose peaks are as lofty as those to the south. The westernmost range, called the *Cordillera Occidental,* runs parallel to the coast northward through Columbia to the Isthmus of Panama. To the east, and separated from the Cordillera Occidental by the narrow valley of the Cauca River is the *Cordillera Central,* one of whose peaks is the famous volcano of Tolima (17,660 feet). Farthest east, and extending northeastward into Venezuela, is the *Cordillera de Bogota.* There are many peaks of 15,000 feet or more in the Northern Andes, but only one, Santa Marta, over 19,000 feet.

Volcanoes and Earthquakes. All the loftiest peaks are either active or extinct volcanoes, and their cones give the characteristic appearance to the landscape. The group in Ecuador, including the active Cotopaxi, Tungaragua and Sangai, has been called the most imposing collection of active and extinct volcanoes on earth. All the districts of the Andes system have suffered severely from earthquakes, and many towns have been entirely wiped out. Valparaiso, Lima, Callao, Quito and Arequipa have been the worst sufferers.

Glaciers, Lakes and Rivers. Glaciers exist on nearly all of the highest peaks, even at the

equator; the largest are in Southern Chile, on the Pacific slope of the range. Both slopes of the Andes, but especially the western, are steep, and in the south many of the glaciers descend so rapidly that they have cut down the mountains far below sea level, thus producing a coast like that of Norway, with many deep fiords and rocky islands. Many of the glaciers in ages past actually cut their way back by erosion over the crest of the range, so the rivers which rise from them flow from the east side of the Andes through depressions to the Pacific.

The rivers of the western slope are mostly short and rapid, but they have little volume, as the western slope, except near the equator, has little rain. On the eastern slope, however, rise two of the greatest river systems of the world, the Amazon and the Plata, and in the Northern Andes a third great river is the Orinoco.

One of the most remarkable features of the Andes is a great section lying between the two ranges of the Central Andes in Bolivia and Northern Argentina. This is a semi-desert region, at an altitude of about 13,000 feet, without drainage either to the Pacific or the Atlantic. Here is the famous Lake Titicaca, with an outlet to Lake Poopo, which once emptied into the Amazon system. The level of Lake Poopo fell below its outlet and it now loses its surplus waters only by evaporation.

Natural Resources. The Andes have large deposits of gold, silver, tin, lead, iron, platinum and quicksilver. The name Andes is derived by some authorities from *anti,* the native Peruvian word for *copper,* which is also plentiful. The plant life, except in the higher altitudes, is like that found elsewhere in South America. The Andean rose, like the Alpine rose, is a famous mountain flower. The animal life shows great variety, including such South American animals as the llama, chinchilla, condor, and vampire bat. For further details, see SOUTH AMERICA; also each of the countries crossed by the Andes. In these the plant and animal life of the various sections of the great range are discussed.

Communication and Travel. Unlike the Alps, in Europe, the Andes are not traveled by many people. There are few established routes, and the wagon roads are almost invariably poor. The inhabitants on the east and west slopes have little intercourse with each other; there are numerous passes over the mountains, but most of them are narrow, steep, hard to cross except by experienced travelers, and sometimes really dangerous. Nearly all of these passes cross at right angles to the main axis of the Andes. Another factor contributing to lack of communications has been the sparsity of population.

In the Central Andes the broken character of the range has made it possible to connect the great interior plateau and the coast by two lines of railway, both of which cross the mountains at an altitude of about 15,000 feet. Here, too, there are more roads and trails than elsewhere in the Andes. Nearly all of the roads leading from the coast, however, end near the summit, and on the eastern slope, where the Madeira and the Plata rivers rise, there is virtually no method of communication. There is a short line of railway, 260 miles long, from Arica, Chile, to La Paz, Bolivia. A more important line from Buenos Aires, Argentina, to Santiago, Chile, was completed in 1909, over the Uspallata Pass. Almost all transcontinental travel goes over this pass, whether by train or wagon. At the summit of the pass stands the monument of Christ, erected by Argentina and Chile to mark the settlement of their boundary dispute. See ARGENTINA, for illustration of this notable piece of statuary. W.F.Z.

Outline on the Andes

1. Location and size
   - (a) West coast of Southern America
   - (b) Length—longest mountain system in the world
   - (c) Average width
   - (d) Average altitude
   - (e) Comparative height
2. Divisions
   - (a) Southern Andes
   - (b) Central Andes
   - (c) Northern Andes
3. Special features
   - (a) Volcanoes and earthquakes
   - (b) Glaciers
   - (c) Rivers
   - (d) Lakes
4. Resources
   - (a) Minerals
   - (b) Vegetation
   - (c) Animal life
5. Communication
   - (a) Few routes
   - (b) Poor roads and dangerous passes
   - (c) Railways in Central Andes
   - (d) Railroad between Buenos Aires and Santiago

ANDORRA, *an daw' ra,* or *an dahr' a,* a republic in the Pyrenees Mountains, between France and Spain. With the exception of San Marino, in the heart of Italy, it is the

ANDORRA

The map locates the little republic, which relies on both France and Spain for protection. The building at the right is the home of the law-making body of the country, called the House of Representatives. It typifies the simplicity of the people.

smallest republic in the world. It has an area of 175 square miles, and a population of about 5,500. The Andorrans are a gentle, peace-loving people, whose chief occupation is the raising of sheep and cattle. Andorra has been independent since the days of Charlemagne, who thus rewarded its citizens for aid in his campaigns against the Moors. The republic is governed by a council of twenty-four members, who serve for four years. There are two judges, one appointed by the French government and one by the bishop of Urgel, in Spain, in whose diocese Andorra lies. In criminal cases the decision of the judges is final, but in civil cases appeal may be taken to the Court of Cassation at Paris, or to the ecclesiastical court at Urgel. Every able-bodied man in Andorra is liable to military service. The capital of the republic is the village of Andorra, with a population of about 1,000.

ANDRE, *ahn' dré,* or *an' dri,* JOHN (1751-1780), a British officer hanged as a spy by the American Revolutionary army because he was the messenger of General Clinton in the negotiations which were to have led to the surrender of West Point by Benedict Arnold. Like Nathan Hale, the famous American spy, Major Andre was a man of the most attractive personality. Handsome, witty, literary, musical, he was one of the most popular men in the British army. His youth, his

JOHN ANDRE

Even the men who captured him and those who sentenced him to death fell under the spell of his charm.

calmness and courage in the face of death, his innocence of any wrong-doing—he obeyed orders though personally opposed to the negotiations with Arnold—make him one of the most pathetic figures in the Revolutionary War. Even Washington, who ordered him tried by court-martial, admitted that he was "more unfortunate than criminal."

Military law, however, made his execution inevitable. Sir Henry Clinton had chosen Andre, his personal aide and the adjutant-general of the British forces in America, to secure from Arnold the plans of the fortifications at West Point. Andre was conveyed up the Hudson River on a British sloop, and secretly met Arnold on shore. While the conference was going on, the guns of the fort were turned on the ship, which was forced to retire, leaving Andre in the American lines. Against Clinton's orders, Andre discarded his uniform and attempted to reach New York, the British headquarters, in civilian dress. Near Tarrytown, only a few miles from the British outposts, he was stopped by three American militiamen, who refused to honor his pass signed by Arnold, searched him, and in his boots found plans and other papers in Arnold's handwriting. Andre was taken to the nearest officer, who was foolish enough to notify Arnold, thus giving the latter a chance to escape. Andre was tried by military court and was hanged on October 2. See ARNOLD, BENEDICT.

ANDRÉE, *ahn' dray,* SALOMON AUGUST (1854-1897), a distinguished Swedish civil engineer and scientific aëronaut, who sacrificed his life in an attempt to reach the North Pole in

a balloon. He constructed a balloon that was buoyant enough to carry three persons, with provisions and apparatus. On July 11, 1897, Andrée with two companions left Spitzbergen, on his ill-fated expedition to the pole. The balloon carried thirteen buoys which André planned to drop at intervals. Five of these eventually came to shore near Spitzbergen, but of Andrée and his companions no trace has ever been found.

ANDREWS, *an' drewz,* Elisha Benjamin (1844-1917), one of the foremost American educators of his day, economist, historian and college president, was born at Hinsdale, N. H. He fought in the Union army during the War of Secession, and lost an eye at the siege of Petersburg. After graduating from Brown University in 1870 he entered the Baptist ministry, but soon gave up this field for teaching. He was professor of history and political economy at Brown from 1882 to 1888, and from 1889 to 1898 was its president. He was then for two years superintendent of schools at Chicago, and from 1900 to 1908 was chancellor of the University of Nebraska. Andrews was a frequent speaker and writer on political, educational and economic topics, and was especially noted as a strong advocate of international bimetallism. He is the author of *Institutes of General History, Institutes of Economics* and *A History of the United States in Our Own Times.*

ANDROMACHE, *an drom' a kee,* in Greek mythology, was wife of Hector of Troy, whom Homer's *Iliad* makes one of the most attractive women of antiquity. The passages describing her parting with her husband when he was setting out for his last battle, and her grief at his death, are among the most pathetic in all literature. After the fall of Troy she was taken to Greece by the son of Achilles. See Troy; Iliad.

ANDROMEDA, *an drom' e da,* one of the favorite heroines of Greek mythology. Her mother, Cassiopeia, wife of the Ethiopia king Cepheus, boasted that Andromeda was more beautiful than the Nereids, and the offended sea-goddesses induced their father to send a frightful monster to ravage the coasts of Ethiopia. To secure the country from destruction Andromeda was chained to a rock to be devoured by the monster, but was rescued by Perseus (which see). After her death she was changed to a constellation, which may be seen in the northern sky.

Ethiopia actually existed; the southern part of it is now modern Abyssinia. See Mythology.

ANDROS, *an' drahs,* Sir Edmund (1637-1714), an English colonial governor in America, whose devotion to the interests of his king brought him into quite serious conflict several times with the colonists. As governor of New York from 1674 to 1683 he made an excellent record. In 1686 he was appointed governor of New England, which had just been made a single province under the name "Dominion of New England." The colonists, angered by this consolidation, refused to recognize the new governor's authority. Andros then made a journey to Hartford to demand the surrender of Connecticut's charter, but, according to the story which was long believed, this document was hidden in a tree which has ever since been called the Charter Oak (which see). In 1688, when news of the revolution in England reached the colonies, Andros was imprisoned by the citizens of Boston, and was even ordered to England to answer charges of tyranny. No formal trial, however, was held, and Andros returned to America in 1692 as governor of Virginia. Here he served for six years and was very popular.

ANE'MIA. See Anaemia.

ANEMONE, *a nem' o nee,* from a Greek word meaning *wind,* is the commonest name of those flowers which are also known as wind flowers; and it is believed that both names were given them because they seemed to grow best in a breezy location. Best known of all the species is the delicate wood anemone, which with its frail white blossoms is one of the favorite spring wild flowers. Some anemones are garden or hothouse plants which produce beautiful blue, red or pink blossoms, and by cultivation may be made "double," like the rose. It has been adopted as the state flower of South Dakota.

ANEMONE

ANESTHETIC, *an es thet' ik,* (classical form, *anaesthetic*), a medicine or other agent which, because of its power to destroy the sense of pain, is to be counted among the greatest blessings of suffering humanity. The word was first used by Dr. Oliver Wendell Holmes, and comes from *anesthesia,* which means *loss of feeling.* Up to the year 1800, when Sir Humphry Davy suggested that laughing gas (nitrous oxide) could be used in surgical operations, little was known about anesthetics, though opium had been used for centuries to deaden unbearable pain, and often with tragic results. Sir Humphry's experiments were the beginning of a new era in the history of medicine. In 1844 Dr. H. Wells, an American dentist, successfully used laughing gas in pulling teeth, and two years later W. T. G. Morton, a Boston dentist, brought ether into general use as an anesthetic. In 1848, Sir James Y. Simpson, a Scotch physician, made known the anesthetic value of chloroform, and since then marvelous progress has been made in this branch of medical practice.

General and Local Anesthetics. There are two groups of anesthetics, general and local. The former cause the patient to lose consciousness, and are of untold value in what are known as the "major operations." The general anesthetics most commonly used at the present time are nitrous oxide, ether, chloroform and mixtures of two or more of these. Doctors have made many experiments to discover the special effects and virtues of these drugs. Ether produces disagreeable after-effects, chiefly intense nausea, but is considered safer than chloroform. Modern refinements in methods of administering ether promise to obviate the worst of these evils. Nitrous oxide is useful in dental work and minor operations where the patient need not remain insensible for more than a few minutes. This anesthetic has no disagreeable after-effects. Experiments in anesthetics are being made continually and their use is constantly being widened. Physicians are also working on the problem of lessening the shock to the nervous system, a great danger in all operations.

Local anesthetics destroy the sense of feeling in that portion of the body to be operated upon, but the patient does not lose consciousness. Ice and various freezing mixtures have long been used for this purpose, as well as the ether spray introduced by Sir Benjamin Richardson, which chills and freezes the tissues by the rapid evaporation of ether. The most important agent for producing local anesthesia, especially in mucous membranes, is cocaine, or one of the various drugs derived from it. These drugs are sometimes sprayed upon the surface to be operated upon, and sometimes they are injected into the tissues. Delicate operations on the eye, ear and throat are made possible by the use of cocaine or its allied drugs, and these anesthetics are widely used in dental work.

The most important development in many years in this branch of surgery, however, is the perfection of an apparatus for administering a mixture of nitrous oxide and oxygen for difficult or painful operations, especially the extraction of teeth, which removes from the latter operation all of its old-time terror. By varying the proportion of the two gases the patient may remain perfectly conscious and yet feel no pain or he may be rendered unconscious, according to the will of the operator. There are no ill after-effects; the presence of oxygen stimulates the patient while under the influence of the mixture.

Midway between general and local anesthesia is regional anesthesia, in which consciousness is retained, but a large area of the body becomes insensible. A very interesting example of this is spinal anesthesia, which is brought about by injecting the proper drug into the sac which contains the fluid that surrounds the spinal cord. As a result the patient ceases to have any feeling in that part of the body below the point of injection. Physicians do not fully agree as to the merits of spinal anesthesia, though many successful operations of this nature have been performed. The future promises remarkable discoveries in this particular field.

Their Use in War. Anesthetics rank high among the agents that serve to lessen the horror of modern warfare, but it is impossible to have them available at all times, especially when the scene of military operation extends over many miles. Early in the War of the Nations, that set all Europe aflame in 1914, it was impossible always to procure anesthetics, particularly chloroform, in sufficient quantities, and many operations were performed without the use of these merciful agents. With the perfection of their hospital facilities the nations at war greatly remedied this state of affairs.

Twilight Sleep. This is the popular name for a condition resulting from the use of certain

anesthetics in childbirth. The method has been most completely tested at the great hospital at Freiburg, Germany, and consists in giving at intervals hypodermic injections of scopolamin and morphine. The patient is said to have all the sensations that ordinarily are felt, but when the ordeal is over she retains not the slightest memory of what has happened. The great value claimed for twilight sleep is that it lessens the terrible shock to the nervous system. It should be noted that certain conditions as to light, sounds, amount of dose, etc., are of highest importance in making the treatment successful. Twilight sleep is a failure when the proper conditions are absent. Whether or not the Freiburg method can be brought into general use must be left to future determination. Several great hospitals have announced their abandonment of the method, claiming that it had been proven unsuccessful. See ETHER; CHLOROFORM; COCAINE; LAUGHING GAS; DAVY, SIR HUMPHRY; MORTON, WILLIAM THOMAS GREEN. W.A.E.

ANGEL, *ayn' jel,* a spiritual being who enjoys immortal life and dwells in heaven as a messenger and minister of God. The angels are considered higher than man, and most religious peoples believe that the faithful of earth become angels after death. There is no clear teaching in the Bible on the subject, but angels are represented in the New Testament as rejoicing over the repentance of sinners, and the Apostles expected Christ to return upon the clouds of heaven in the company of holy angels. Satan and those who joined him in the rebellion against God are often spoken of as "the devil and his angels." There are frequent references of this kind in the Bible.

ANGELICO, *an jel' i ko,* FRA (1387-1455), the common name of FRA GIOVANNI DA FIESOLE, the last and greatest of the Italian painters who lived in the period between the Middle Ages and the Renaissance, and the greatest religious painter of all time. He became a Dominican friar in 1408. His early paintings gained him such renown that in 1455 he was summoned to Rome by Pope Eugenius IV to decorate his private chapel in the Vatican. Fra Angelico also painted scenes from the lives of the saints for the chapel of Pope Nicholas V. These paintings reveal the highest development of his art.

His works are considered unrivaled in finish and in sweetness and harmony of color and were made the models for religious painters of his own and succeeding generations. He was the first to show the real beauty of nature in landscape painting. The best of his work is now to be seen in the Vatican at Rome and in the frescoes at San Marco in Florence, and many of his paintings are found in the galleries of Europe. *The Last Judgment,* the *Madonna of the Star* and the *Coronation of the Virgin* are some examples of his art. See MADONNA.

ANGELL, *ayn' jel,* JAMES BURRILL (1829-1916), an American educator whose name is everywhere connected with the development of the University of Michigan from a school of secondary importance to one of the greatest American universities. In addition to his fame as an educator, however, he was a diplomatist of high rank. He was born in Scituate, R. I., was graduated in 1849 from Brown University, and, after study and travel in Europe and the South, returned to Brown in 1853 as professor of modern languages and literature. He edited the Providence *Daily Journal* from 1860 to 1866 and served as president of the University of Vermont from 1866 to 1871. In the latter year he accepted the presidency of the University of Michigan. Dr. Angell broadened and strengthened the work of that institution, raising it to the front rank of American universities. It has been said of him that "his wide culture, his personal kindliness, his catholic intelligence and his general learning have had quite as much influence as specific words or acts or any university policy."

JAMES B. ANGELL

Dr. Angell's career as a diplomatist began in 1880, when he was appointed United States envoy extraordinary and minister plenipotentiary to China. In 1887 he was made a member of the Anglo-American International Commission on Canadian Fisheries; and in 1896 he was made chairman of the Canadian-American Commission on a Deep Waterway from the Great Lakes to the Sea. In 1897 he was appointed minister to Turkey, but he gave up the position in the following year, and returned to the University of Michigan. He wrote a *Manual of French Literature, Progress in*

International Law and numerous articles for the *North American Review* and other leading periodicals of the country. In October, 1909, Dr. Angell retired from active life and became president emeritus of the University of Michigan. He received degrees from the leading universities, and in 1887 was made a regent of the Smithsonian Institution.

ANGELUS, *an' je lus,* THE, one of the most popular and best-loved paintings in the world, of which innumerable copies in all sizes have found places in the homes of picture-lovers the world over. It shows two peasants stopping their work in the field to pray at the sound of the angelus bell in the distant church tower. They are true peasants, in appearance and clothing types of their class, and their reverential attitude has in it an extreme humility. By his grasp of the principles of drawing in perspective, the artist has given the impression that the field extends back miles and miles to the modest church.

This picture was painted in 1859, by the French artist Millet (which see), and was sold by him for 500 francs ($100), but so rapidly did it advance in public esteem that $125,000 was paid for it in 1889 by the American Art Association, which brought it to the United States. In the next year it was purchased by M. Chanchard for $150,000, and taken back to France, where it now forms one of the ornaments of the Louvre. Although not considered by critics one of the artist's greatest pictures, it has a depth of feeling which goes far toward accounting for its popularity.

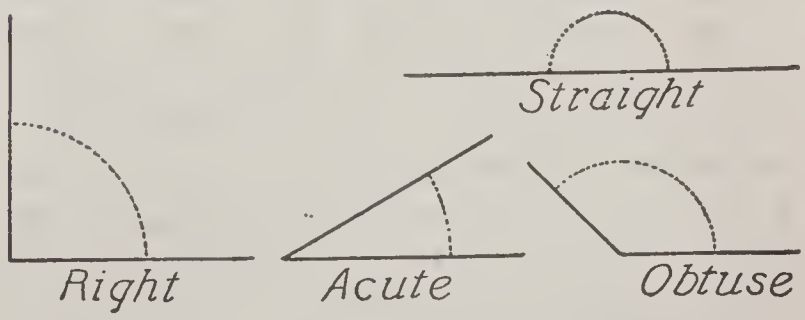
The Angelus Bell is rung at morning, noon and night in Roman Catholic countries, and at its call faithful worshippers stop their work long enough to repeat the angelic salutation, or *Ave Maria.* The name is taken from the opening words of the prayer, "Angelus Domini nuntiavit Mariae" (the angel of the Lord declared unto Mary), which is in memory of the annunciation to the Virgin Mary by Gabriel that she should be the mother of Christ.

ANGINA PECTORIS, *an ji' na pec' to ris,* or **HEART SPASM,** is a symptom of disease, rather than a disease. A very acute pain, felt over the heart or deep in the chest, extends through the left side, shoulder and arm. The sufferer is held motionless, feels suffocated and fears sudden death. Occasionally the first attack is fatal; if not, other attacks will be likely to follow. Men past forty years of age, having some organic disease of the heart or arteries, are the principal victims. The immediate cause is something which impedes the heart's action, such as excitement, emotion, worry, or excessive physical exertion. The best treatment is a quiet, regular life, with freedom from excitement and physical overexertion. W. A. E.

ANGIOSPERMS, *an' je o spurmz.* All the seed-bearing plants in the world are divided into two great groups—one in which the seeds are protected by a seed-case, the other in which the seeds are naked or exposed. Plants belonging to the former of these two classes are known as *angiosperms,* the name being taken from two Greek words meaning *vessel* and *seed.* The most prominent part of the vegetation of the earth is included in this class, which comprises plants of all sizes, from the tiniest forms that float about on the water to huge trees. The evergreens, however, belong to the other class, for they have their seeds exposed.

In all seed-bearing plants there must be what is called *cross-fertilization;* that is, the pollen must be carried from the stamens to the pistils (see BOTANY; FERTILIZATION). Sometimes this is done by the wind, but in the angiosperms it is mostly done by various insects; and the way in which the flowers have developed bright colors and sweet scents to attract the necessary insects is one of the most interesting things in all botany. The rose, the lily, the orchid, in fact all the plants which have noticeable flowers, as well as most trees except the evergreens, are members of the plant group called angiosperms.

ANGLE, a word derived from the Latin *angulus,* meaning *corner.* An angle is formed by the meeting of two lines. The term is sometimes applied loosely to the space between the meeting lines, but is used correctly only



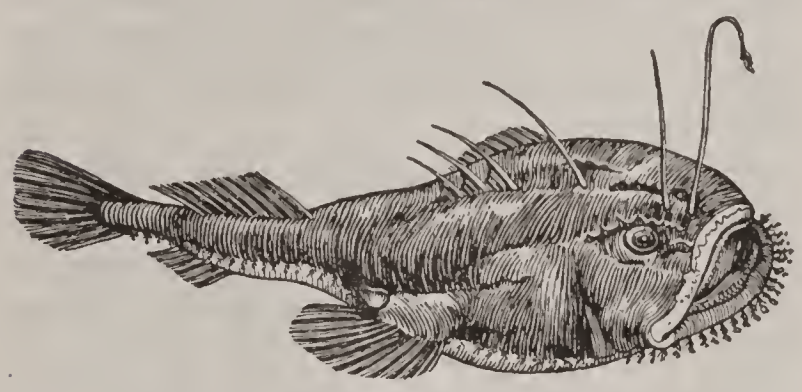
ANGLES

as the measure of the difference in the direction of the lines. The corner, or place of meeting, itself is the *vertex,* and the lines are the *sides* of the angle. As the difference in direction forms the angle, the length of the sides need not be considered.

An angle is measured in degrees, a degree

being equal to $\frac{1}{360}$ of the circumference of a circle whose center is the vertex of the angle. If the sides of an angle are in the same straight line but on opposite sides of the vertex, the angle is a *straight* angle, of 180°. Half of a straight angle, or 90°, is a *right* angle; two straight angles equal 360°, or a *perigon*. Angles of less than 90° are *acute;* between 90° and 180°, *obtuse;* between 180° and 360°, *reflex*. If the sides of the angle are straight lines, the angle is called *rectilinear;* if they are curved, *curvilinear*.

ANGLER, FROG FISH or **SEA-DEVIL,** a strange fish with a wide head; a back set with sharp needles; a sort of beard around its head, said to resemble seaweed; three brightly colored head tassels which are thought to be its bait; and two rows of long in-pointed teeth.



THE ANGLER OR SEA-DEVIL

It is found near the British Isles, and is often over five feet long. In American waters a somewhat similar fish is known, called *American angler, fishing-frog* or *goose-fish*. It is from two to three feet long, and has such a wide mouth that it can swallow fish nearly as large as itself.

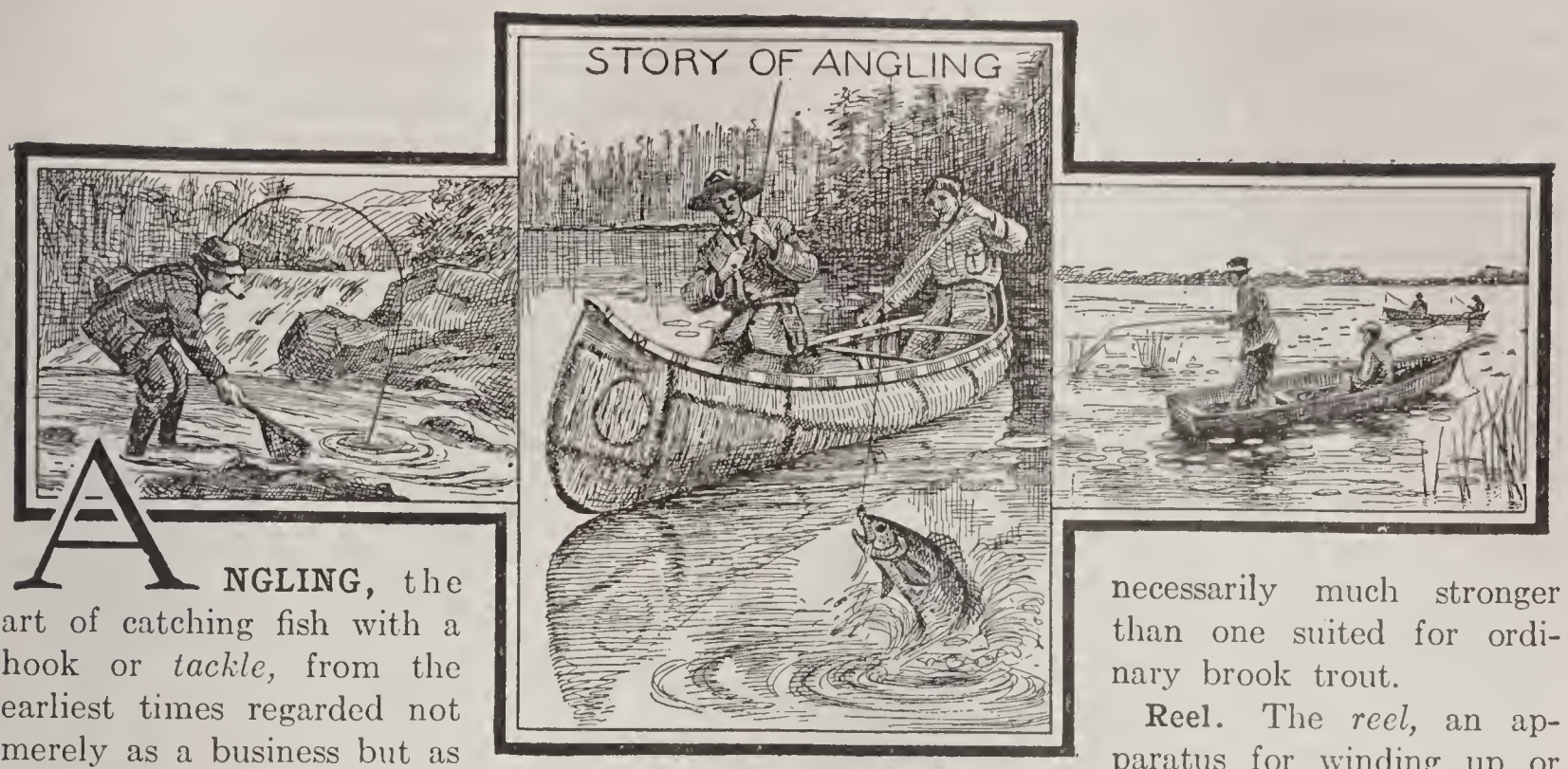
ANGLES, one of the three tribes that invaded Britain during the fifth century and united to comprise the people that formed the English nation. The other tribes were the Jutes and Saxons (see ANGLO-SAXONS). The Angles belonged to the Low German division of the Teutonic peoples, and their original home was the district of Angeln in Schleswig-Holstein. The name England (Anglo-Saxon *Engla-land*) is derived from the name of the Angles. They were the founders of three kingdoms on the island—East Anglia, Mercia and Northumbria. See ENGLAND, subhead *History*.

ANGLICAN CHURCH, strictly considered, is the name of the established Church of England. In the broader and more general sense the Anglican Church or Anglican Communion includes not merely the Church of England but the Scottish Episcopal Church, the Church of Ireland and the Church of England in the British colonies. The relations of these branches to each other and to the whole are very loose; as a united body the Church throughout the world is represented only at the Lambeth Conferences, at which the bishops meet. The Lambeth Conferences, so named from Lambeth Palace, the residence of the Archbishop of Canterbury, only advise; they cannot legislate on matters of doctrine or practice. The Protestant Episcopal Church in the United States, though formerly regarded as a branch of the Anglican Church, is now in fact a separate body.

The doctrines of the Anglican Church are contained in the Thirty-nine Articles, and the ritual is in the Book of Common Prayer. The membership of the Anglican Church is divided into three groups, all of which agree on the fundamental belief but differ to a considerable degree on questions of ritual and minor points of doctrine. These three groups are called High Church, Low Church or Evangelical, and Broad Church.

ANGLIN, *ang′ glin,* MARGARET (1876-), one of the most distinguished American actresses, was born at Ottawa, Canada. Her father, Timothy W. Anglin, a New Brunswick journalist and politician, was one of the Liberal leaders in the Dominion House of Commons, and from 1874 to 1878 was its Speaker. Margaret Anglin's first professional appearance was in 1894 in *Shenandoah,* a melodrama of the War of Secession. She made rapid progress, and soon became leading lady for such well-known actors as James O'Neil, Edward H. Sothern and Richard Mansfield. She appeared as a star in *Zira,* in 1905, then in the leading rôle in *The Great Divide, The Awakening of Helena Ritchie, Green Stockings* and *Beverly's Balance*. In later years she essayed classic plays, including English versions of the *Antigone* and *Electra* of Sophocles, and the *Medea* and *Iphigenia in Aulis* of Euripides. These she presented in the Greek Theater at the University of California, the last two for the first time in 1915. She also played several Shakesperean rôles, including Katherine in *The Taming of the Shrew* and Viola in *Twelfth Night*. In 1911 Miss Anglin was married to Howard Hull, a dramatic critic.

Her brother, FRANCIS ALEXANDER ANGLIN (1865-), one of the foremost Canadian lawyers and jurists, was born at Saint John, New Brunswick. He was called to the bar in 1888, became judge of the Ontario High Court in 1904 and judge of the Supreme Court of Canada in 1909.



ANGLING, the art of catching fish with a hook or *tackle,* from the earliest times regarded not merely as a business but as one of the most alluring of sports. There are frequent references to this art in Greek and Latin authors, it is mentioned several times in the Old Testament, and ancient mural paintings show that it was practised ages ago in Egypt. A fisherman may fish for food; his is a vocation. Fishing to an angler is a game; he loves the rush of the brook or the cold blackness of a deep lake; he seeks the odors and the peace of out-of-doors; he craves the excitement of the catch, to test his skill against that of the fish. A perfect angler, says a Greek poet, is "a well-made, active man, patient, vigilant, enterprising, courageous and full of expedients." Good Izaak Walton, whose little book, *The Compleat Angler,* made him immortal, expressed himself thus:

"We may say of angling as Dr. Boteler said of strawberries: 'Doubtless God could have made a better berry, but doubtless God never did'; and so, if I might be judge, God never did make a more calm, quiet, innocent recreation than angling.'"

Rod. Of the material appliances needed by the angler, the first is the rod. Rods are made of various materials and of various sizes. The cane rods are lightest, and where fishing tackle is sold they most commonly have the preference; but in country places the rod is often of the angler's own manufacture. Nearly all rods used in fresh-water fishing are made in separate joints, so as to be easily taken to pieces and put up again. All rods taper from the butt end to the top, and are usually possessed of considerable elasticity. In length they may vary from five feet to more than twenty, with a corresponding difference in strength—a rod for catching salmon being necessarily much stronger than one suited for ordinary brook trout.

Reel. The *reel,* an apparatus for winding up or letting out the line, is attached to the rod near the lower end, where the hand grasps the rod while fishing. The best reels are of simple construction and are so made as to run rapidly. Those of the better class run on jeweled bearings, and the cranks are so geared that when they are turned once the barrels on which the lines run turn four times. Other reels are only double-multiplying; that is, the spools revolve twice to each turn of the handle, while trout reels and salmon reels, commonly called "single-click" reels, revolve only once to every turn of the handle. It is not necessary for these reels to be multiplying, as the fish is played by stripping the line and not with the reel, as in bass fishing.

Line, Hook and Float. The *line* is sometimes made of finely-twisted fine silk, but more often of braided silk. For trout fishing this is stiffened by oiling. To the end of this may be tied a piece of fine gut, on which the hook or hooks are fixed. For casting heavy bait the line is a little heavier and the gut leader is discarded. The *hook* of finely-tempered steel should readily bend without breaking and yet should retain a sharp point. It should be long in the shank and deep in the bend and the barb should be long. In size and shape the hooks must be adapted to the kind of fish that are angled for. In still-fishing from a pier or anchored boat, *floats* formed of cork, goose and swan quills, are often used to buoy up the hook so that it may float clear of the bottom. For heavy fish or strong streams a cork float is used; in slow water and for lighter fish, a quill float.

Bait. *Baits* consist of a great variety, nat-

ural or artificial. Grasshoppers, worms and minnows are good bait in trout-fishing, while crawfish. small frogs and minnows are best for bass. The artificial flies so much used in angling for trout and salmon are made of hairs, furs and wools of every variety, mingled with pieces of feathers and secured together by plaited wire, gold and silver thread, marking silk or wax. The wings may be made of the feathers of domestic fowls, or any others of a showy color. Some angling authorities recommend that the artificial flies should be made to resemble as closely as possible the insects on which the fish is wont to feed, but experience has shown that the most conspicuous and unnatural combinations of feather and fur have been often successful where the most artistic imitations have failed. Artificial minnows and spoon-shaped pieces of metal are also used by way of bait, and are so contrived as to spin rapidly when drawn through the water in order to attract the notice of the fish. Angling, especially with the fly, demands a great deal of skill and practice.

Open and Closed Season. The true angler, who fishes for love of the sport, is not the one against whom the fish must be protected, but there are persons who are anglers merely in outward appearance, persons who would, if unrestrained, exterminate all game fish. Nearly every state and province now protects its fish by a closed season, during which it is illegal to fish. The closed season varies with the habits of the fish and the location of the fishing grounds. As a general rule, spawning time is a closed season, extending from April to June or July. In many states and provinces fishing is also illegal during the winter months, and non-residents who desire to fish are nearly always required to pay a small license fee ranging from one to five dollars. The laws on this subject are so varied that the angler should find out for himself just which ones apply to the locality in which he wishes to fish.

H.K.S.

ANGLO-SAXONS, *ang' glo sax' uns,* the ancestors of most of the English-speaking peoples, a race formed by the union of the German tribes who settled in Britain in the fifth and sixth centuries after Christ. The most important of these were the Angles, Saxons and Jutes. The Jutes, the earliest comers, left their original settlements in the regions about the mouths of the Elbe and the Weser, and took possession of Kent, the Isle of Wight and the opposite coast of Hampshire. They were followed by the Saxons, who had inhabited the regions along the Baltic Sea, and by the Angles, who came from the territory in North Germany between the North and the Baltic seas.

Before the end of the sixth century the Angles had conquered Southeastern Scotland and Eastern and Middle England; the Jutes were in possession of Kent and the Isle of Wight, and the Saxons held the remainder of Southern England west to Devonshire and Wales. The conquests of the Angles were the most extensive, and from them England, "land of the Angles," took its name. The various kingdoms established by these conquerors were united into one state in 827 by Egbert, king of Wessex. Athelstan, who came to the throne in 925, was the first monarch to use the title "king of England." Many modern English terms, such as *earl, alderman* and *sheriff,* are derived from Anglo-Saxon institutions. See ENGLAND, subhead *History;* also, ANGLES.

ANGOLA, *ang go' la,* a Portuguese possession with an area of 500,000 square miles, is situated on the southwestern coast of Africa. Loanda, the principal town, was long the great Portuguese slave market. This trade was

ANGOLA

Its territory is marked in black. The area is nearly twice as large as Texas or the great province of Alberta.

abolished by law in 1836 but was continued for many years after that date, in the interior, where men were captured and sold as recently as the beginning of the twentieth century. The chief exports of Angola are ivory, palm oil, coffee, fish, gum, wax and cotton. Population, about 4,000,000.

ANGORA, *ang go' ra,* a very old town in Asiatic Turkey, capital of the province of the

same name, 215 miles southeast of Constantinople. It is famous as the original home of *angora goats,* whose long hair forms the town's

THE ANGORA GOAT

principal article of commerce. It is connected with Constantinople by railroad and has also an extensive trade in mohair cloth, dye stuffs, gums, wax and honey. Camlet, a costly material made from the hair of the angora goat, is produced in great quantities. All the animals of this region have long fine hair, probably due to some atmospheric influence, for if they are removed to any other district the hair becomes coarser. The city has many remains of Byzantine architecture and relics of Greek and Roman periods. Population, about 35,000.

ANILINE, *an′ il in,* a colorless, oily liquid, somewhat heavier than water, which by treatment with other substances forms a number of brilliant and lasting dyes. Aniline was discovered in 1826, but the discovery was of no importance until thirty years later, when a young English chemist, Perkin, accidentally learned how to make from it a most beautiful violet dye. Conscant experimenting produced other lovely colors, and the dyer's art at once advanced to a higher plane than it had ever before reached. Originally obtained directly from coal-tar, it is now made chiefly from nitro-benzene, which in turn is made from benzene, the latter being contained in coal tar in much larger proportion than aniline itself. Before the War of the Nations, which began in 1914, the Germans had almost a world monopoly of the coal-tar industry. This was partly due to the attention paid to the art by their chemists, but partly also to their efficient business organization and to skilfully-framed laws. The war, by putting a sudden stop to the exportation of coal-tar dyes, spurred chemists of other nations to intensive study; in the United States, especially, what had been almost an exclusive German art became firmly established as an American industry. See Coal-Tar. J.F.S.

ANIMAL. The simplest forms of animal life consist of one cell only, and look much like the lowest orders of plant life (see Cell). Scientists are unable to tell whether some of these tiny cells are animal or vegetable. These simple cell animals have the power to do in themselves, without any special organs, all things necessary for their life. The higher orders of animals are composed of billions of cells, and have many intricate organs, each with its special work to do. For instance, one set of organs is employed in the collection of food, another in its digestion, others in carrying the food through the body, bringing air into the system or carrying off waste and dead matter. In different animals these organs vary greatly, but their purposes are the same.

No true distinction can be made between plants and animals, even in many of the higher organisms, by form alone. Thus it is impossible to say that the power of motion belongs only to animals, for some plants can move and many animals are rooted or fixed. The great distinction between plants and animals lies in the way in which they assimilate food, that is, change it into such form that it is useful in building them up. Almost all plants feed on inorganic food, that is, food which is neither animal nor vegetable. Animals, on the contrary, require organic or living matter, and so are dependent upon plants or upon other animals for food. Again, animals are dependent upon a proper supply of oxygen for their life, but plants require carbonic acid, which is generally poisonous to animals. Animals receive the food into the interior of their bodies and digestion takes place in their internal organs, but plants receive the food into their external bodies and digest and assimilate it in the external parts, for instance, in the leaf-surfaces, under the influence of sunlight (see Chlorophyll). As plants and animals become more complicated in structure the distinctions between them broaden until it is useless to point them out. All the hundreds of thousands of animals which inhabit the globe have been divided according to certain traits or peculiarities into great groups, which have been again and again subdivided, for no matter how many points of likeness animals have, their differences are even more noteworthy, and but for the char-

acteristics pointed out above, no one would consider placing a sponge and a man together in even the widest of classes.

Even the most superficial study of the animal life about one brings up many questions and leads into most interesting fields of thought. The cat on the back fence, for instance, and the tiger at the zoo—are they really related? They look alike, to be sure, but is the resemblance just superficial, or is it recognized by scientists? Is there any reason why a polar bear is white and the cinnamon bear brown? Why, when fish lay so many eggs, do not the waters of the earth become full of fish? These and many more questions are answered by zoölogists, and are also explained in various articles in these volumes. In the article Zoölogy, there is to be found a classification of the animal life of the globe. C.H.H.

Animal Intelligence and Senses

Occasionally there appears in the papers or on billboards the announcement of the wonderful achievements of an educated horse or dog, and at once the question as to just how much intelligence animals do possess comes to the fore. Some of the actions of animals seem at first sight to argue a high degree of intelligence—the setting of sentries by the wild beasts, the choice of migration routes by the birds, and the almost incredible things which the little hive bee accomplishes. But conclusions must not be reached too quickly—it is unsafe to infer from human-like actions the possession of human reasoning powers. The whole question as to the intelligence of animals really hinges on this: are they capable of reasoning? That is, can they figure out or argue that because this or that is true, some other thing must necessarily be true? And the most authoritative writers on the subject, those who have given the matter sympathetic thought, are inclined to believe that no animal has the ability to put together facts and so work out a conclusion.

Animals have an instinct which directs them under circumstances in which human beings would employ long reasoning processes; and it is probable that when the mother bird "each fond endearment tries, to tempt her new-fledged offspring to the skies," she is not definitely planning for their welfare but simply following a blind instinct which tells her to do thus and so.

Animal Stories. Among the popular stories of animals there are several attitudes to be noticed toward this question of intelligence in animals. Some tales, like the "Uncle Remus" stories of Joel Chandler Harris or Kipling's *Jungle Books,* are frankly imaginative and give to the animals powers and gifts which no one really believes they possess. Others treat them simply as animals with instinct, but without anything which resembles human intelligence; but perhaps the most popular stories of all are those which lie between these two extremes. These do not give their animal heroes the power of speech, or even really human reasoning powers, but they do endow them with many almost human qualities, so they have distinct characters and arouse the love and sympathy or the dislike of the reader. Of this last-named class of stories those of Ernest Thompson Seton are probably the best known. See Seton, Ernest Thompson.

Special Senses. When the subject of the senses is approached, the student of animals finds himself on surer ground, for the fact is undisputed that the senses of sight, hearing, touch, taste and smell exist in the animals, though in widely-varying degrees. No one who has heard a horse whinny with joy at the approach of his master, or who has read the pathetic tale of *Rab and His Friends,* can doubt that animals also experience emotions. But as to these, of course less definite information exists.

Sight. No general statement can be made about the sense of sight of animals, so wide is the range. There is the sightless mole which burrows its way through the ground, and there is the eagle which, flying high in the air, espies the tiny field-mouse on the ground. Some animals, as the bat, the members of the cat family and the owl, can see far better at night than in the daytime, owing to a peculiar formation of the eye; but most of them resemble men in that they see better in the light. With the lower animals it is difficult to discern just what part in their activities sight plays, for it may be that often when they seem to perceive things with this sense they are in reality guided by their sense of smell. Certain insects which help in the fertilizations of flowers apparently distinguish colors, for they will neglect one flower and

ANIMALS, FROM NORTH TO SOUTH

KATE ABELMANN.

fly to one of another color when there is no other difference; but most insects, it is probable, see but poorly.

Hearing. The sense of hearing is no more evenly distributed than that of sight, but in general it may be said that the higher animals have it in far greater perfection than the lower. The horse traveling the flinty road hears the hoof-beats of another horse approaching him before the sound reaches his driver's ears; the watch dog pricks up his ears at a noise which is inaudible to every human inmate of the house. It was long believed that fish were entirely deaf, but it seems to be an established fact that some sounds do reach them, though probably not enough to make necessary the "silence" warning to fishermen.

Touch. The sense of touch does for some animals much that the sense of sight does for man. The "feelers" of certain insects, the whiskers of the cat—these are special touch organs developed through long usage. A dog's ears seem to be the most sensitive part of its anatomy, while in a bat the wing membrane responds to the slightest touch.

Taste. Here again it is almost impossible to speak with accuracy, for while it is certain that animals delight in one kind of food and reject another, it is probable that smell rather than taste guides them. The two are very closely connected, even in man; and the person who has absolutely lost his sense of smell can distinguish only sweet, sour, bitter and salt. That there is some sense of taste even in the lower forms of life is proved by the fact that insects can tell sweet from bitter—a distinction probably not made by the sense of smell.

Smell. Everybody is familiar with the fact that some animals have an almost incredibly keen sense of smell. That of most dogs is so acute as to enable them to recognize people whom them have once seen, and certain species of dogs can track a person by scent, even when the trail is crossed by numerous others. A deer, too, when the wind is right, can detect the presence of man before eye or ear makes it evident. In no other members of the animal kingdom is the sense of smell more pronounced than in insects. It is because of this fact that flowers have developed fragrance—that they may attract to themselves the insect visitors so necessary to their complete life. A new bee in a hive does not need to be guided to the nearest locust-grove; the sweet scent is sufficient guide. On the other hand, birds, reptiles and most fish depend very little on their sense of smell. V.L.K.

Migration of Animals

This is a term used to denote first, the irregular overflow of such animals as mice, lemmings, locusts and chinch bugs from their more usual range, and second, the periodic movements of fishes, birds, seal and many other animals at the changes of season. As these two classes of movements are different in character, they are discussed separately below.

Irregular Overflows. The movements of the lemming, a rat-like animal found mostly in Norway and Sweden, furnish a good example of this class. At irregular intervals of five to twenty years great hordes of lemmings leave their homes and travel toward the sea. The explanation seems to be that they multiply so rapidly that the food supply in the vicinity of their homes becomes too small. Then the excess of animals must wander off to other regions; instinctively they move for the preservation of the species.

A similar explanation accounts for the plagues of mice and Rocky Mountain locusts which occasionally ruin thousands of acres of grain on the plains of North America. Flies, chinch bugs, army worms, rabbits, antelopes and other animals are known to travel far in search of feeding grounds, and these acquired locations become their new homes.

Periodic Migrations. Many animals migrate two or more times a year, the temperature and food supply determining the time and extent of such movements. At the approach of spring the mountain sheep and goats leave the regions in which they have spent the winter and climb upward to the cooler altitudes. Each autumn the caribou travels from his haunts near the Arctic Ocean to the warmer regions around Hudson Bay, and each spring he reverses this course. Years ago, when the buffaloes were still plentiful, their herds wandered north or south with the changing seasons. Whales, especially the sperm whales, have regular courses along the coasts of North America.

Some of the most remarkable migrations are those of fishes, especially the salmon, which ascend and descend rivers, even through rapids

and waterfalls. Many other fishes seek the depths of the oceans or lakes when winter comes, and return to shallower waters only when the sun rays in the next spring and summer again warm the water. Cod, herring, bass, pike and whitefish make longer or shorter migrations according to local conditions.

Most wonderful of all are the migrations of birds, some species traveling even 8,000 miles twice a year. This absorbing story is told in the article Birds, subtitle *Migration of Birds.* See, also, article on each of the animals mentioned above. V.L.K.

Related Subjects. The forms of animal life described in these volumes are too numerous to be listed here, but they are all carefully classified and indexed elsewhere. By consulting the following articles, with the indexes that follow most of them, the student may acquaint himself with a classification, not too technical, of the important animals of the world:

Amphibians
Animal Worship
Arachnida
Birds
Carnivorous Animals
Cetaceans
Crustaceans
Diseases
Edentata
Fish
Insects
Invertebrates
Mammals
Marsupials
Mollusks
Primates
Reptiles
Rodents
Ungulates
Vertebrates
Zoölogy

Animal Products

Ambergris
Beeswax
Bristles
Buckskin
Catgut
Courie
Gelatin
Glue
Glycerine
Ivory
Leather
Mother-of-Pearl
Musk
Pearl
Shell
Spermaceti
Tallow
Wax
Whalebone
Wool

See, also, *Animal Products* in list of *Related Subjects* at end of article Food.

ANIMALS, Diseases of. See Diseases, subtitle *Diseases of Animals.*

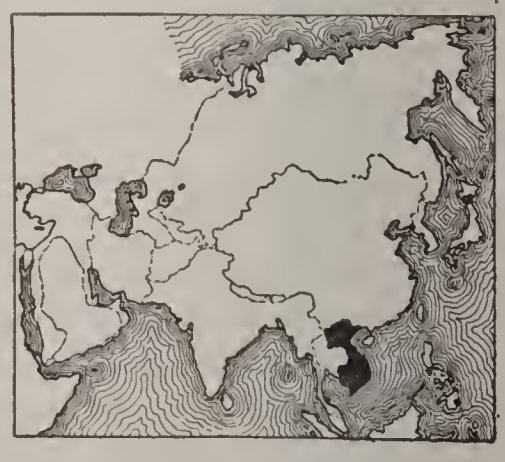
ANIMAL WORSHIP, a part of the religion of very many barbarous and partly-civilized peoples. It does not grow out of love for the animals, but usually out of fear or a belief that the souls of the dead live again in animal bodies. Just as many heathen tribes worship demons because they imagine that by so doing they can induce the demons not to injure them, so they often worship the animals of which they are most afraid, especially the mysterious ones that prowl about at night.

In India belief in the transmigration of souls is very common; that is, most of the people imagine that a soul lives many lives, each life in a different body, and that some of these bodies are those of animals. If, therefore, a man hurts a cat or a monkey or even a crawling bug, he may be injuring his grandfather or his mother, and as a consequence the greatest reverence is shown to animals. The ancient Egyptians held that each god and goddess had certain sacred animals, and to kill one of these was to offend some deity. So strong was this belief that people were in some places put to death for killing a sacred animal. See Transmigration of the Soul.

ANISE, *an' iss,* a plant grown chiefly for its seeds, which because of their warm, spicy taste are much used to flavor liquors and candies. Although a native to Egypt and other Eastern countries, it has been introduced into Italy, Spain, France, Germany and the United States, but it can be brought to perfection only in regions which have a fairly long, hot summer. The seeds as well as the oil, which has a similar smell and taste, have some value as a medicine, especially for children.

ANISE
(*a*) flower; (*b*) seed.

ANN, a cape off the coast of Massachusetts, thirty-one miles northeast of Boston. It is a bold, rocky headland, containing valuable quarries of granite for building purposes. The towns of Gloucester, Rockport and the village of Squam are on this bluff.



ANNAM
Black area is location of Annam. Compare its size with remainder of Asia.

ANNAM, *an nam',* also spelled Anam, is a province of Indo-China between Siam and the South China Sea, under French protection since 1884. It has an area of 52,100 square miles and a population of nearly 6,000,000,

of whom only 1,900 are Europeans, exclusive of the military forces maintained by France. It was formerly governed by a monarch whose power was absolute, but in 1914 the king was compelled to abdicate in favor of his son, a boy of fourteen. Though nominally still a monarchy, all the power is vested in French officials.

Education and Religion. Under French supervision the educational advantages are improving, but mostly for the benefit of boys; while there are over fifty schools for them, there are only seven for girls. The Annamese are principally of Mongolian stock, but are smaller and less robust than the Mongolians found farther north. Their language is similar to Chinese, and their religion is Buddhism, though the educated classes have largely become followers of Confucius. Like the Chinese, the natives do not take readily to Christianity, but flourishing missions are maintained by the Roman Catholics and the leading Protestant churches.

Resources. The mineral wealth of the country is considerable, and has been greatly developed recently. Gold, iron, copper and zinc are extensively mined, and coal of fair quality is found. The soil is fertile and produces rice, maize, tobacco, sugar, many kinds of fruit, coffee, areca nut and medicinal plants. A large area of unprofitable land has been reclaimed, the Phanrany River being dammed to irrigate 10,000 acres, and many other irrigation works have been erected elsewhere in the province. The mulberry tree is extensively cultivated for its leaves, on which the silk worms feed, the raw silk export forming one of the most important items of commerce. Cattle raising is one of the principal occupations.

Imports and Exports. The imports consist chiefly of cotton and paper goods, tea, tobacco and petroleum. The exports, in addition to raw silk (three-fourths of the production of which is exported), are sugar, rice, cotton and paper. Most of the trade is carried on with France and its foreign possessions. The capital is Hué, with a population in 1912 of 60,611. The chief ports are Tourane and Fai-Foo.

ANNAP'OLIS CONVENTION. Soon after the Articles of Confederation were adopted by the thirteen American colonies, which had been fighting for independence, Virginia and Maryland had a dispute about the navigation of Chesapeake Bay and the Potomac River. The difficulty finally led Virginia to ask the other states to send delegates to Annapolis, Md., to discuss changes in the Articles of Confederation, especially to cover defects in those parts referring to commerce and navigation. The delegates met September 11, 1786, but only five states were represented—New York, New Jersey, Pennsylvania, Delaware and Virginia.

It was evident almost at once that the Articles of Confederation were inadequate not only in relation to commerce, but in many other respects. The convention, urged on by Alexander Hamilton and John Dickinson, invited all the states to send delegates to a second convention for the purpose of adopting a new constitution. This second convention met at Philadelphia in May, 1787, and finally adopted the present Constitution. The story of this immensely important document is told in the article, CONSTITUTION OF THE UNITED STATES. See, also, ARTICLES OF CONFEDERATION.

ANNAPOLIS, MD., is the state capital and the county seat of Anne Arundel County, twenty-six miles south by east of Baltimore, thirty miles directly east by north of Washington, D. C. It is on the southwest bank of the Severn River, two miles from its entrance into Chesapeake Bay, and is served by boats to Baltimore and other cities on the bay, and by the Maryland and the Annapolis, Washington & Baltimore electric railways. The population in the years 1910 and 1920 was 8,609 and 11,214, respectively.

Annapolis is best known as the seat of the United States Naval Academy (which see). It is a small, quaint place, one-half square mile in area, and retains many evidences of Colonial days. The state house, the corner stone of which was laid in 1772, occupies a hill in the center of the town (see MARYLAND, for illustration). Other interesting features are the state treasury building, Saint Anne's Protestant Episcopal Church, Saint John's College (founded in 1789), the marine barracks and naval experiment station and statues of Chief Justice Taney and General De Kalb. Extensive oyster-packing establishments serve a large foreign and domestic trade.

A settlement called Providence was made on the site of Annapolis in 1649 by a company of Puritans from Virginia. After having adopted various names, that of Annapolis was chosen in 1694 in honor of Princess (later Queen) Anne. The place became the capital of the province in 1694, and in 1708 became

a city under a charter granted by Queen Anne. Congress met in the state house at Annapolis from November, 1783, to June, 1784, and to this body, on the 23rd of December, 1783, General Washington resigned his commission as commander-in-chief of the Continental Army.

ANNAPOLIS ROYAL, N. S., a town situated on the bay of Fundy, at the mouth of the Annapolis River, 130 miles west of Halifax. It is famous in history as the PORT ROYAL of the Acadians, and is the oldest settlement of Europeans in British North America. It was founded in 1604, four years before Champlain founded Quebec, and sixteen years before the Pilgrims landed at Plymouth. During the seventeenth century it was the scene of many conflicts between the French and English, and several times changed hands. Finally, in 1713, it was ceded to England, and its name was changed from Port Royal to Annapolis Royal, in honor of Queen Anne. The old fortifications have been restored by the town with financial assistance from the Dominion government, and the memory of Sieur de Monts (see MONTS, SIEUR DE), the founder of the settlement, is honored by a monument within the walls.

Annapolis Royal is of importance at the present time. It is the export center for a famous apple-growing region, and also ships lumber, canned and preserved fish and bricks. The harbor, which is one of the most beautiful in the Dominion, can accommodate ocean steamers. Population in 1911, 1,019.

ANN ARBOR, MICH., county seat of Washtenaw County and the home of the State University of Michigan. The city is in the southeastern part of the state, situated on hills overlooking a great expanse of rich fruit and farm lands. To the north is the valley of the Huron River. The city is on the Michigan Central, the Ann Arbor and the Detroit United railways. Interurban lines run to all of the larger surrounding towns, and the cement automobile road from Detroit part of the way to Chicago passes through Ann Arbor. Detroit is thirty-eight miles northeast, Jackson is the same distance west, and 244 miles almost due west is Chicago. The population in 1910 was 14,817; in 1920 it was 19,516. To this number over 7,000 students are added during the regular university year and a large number during the summer session. The area of the city is nearly five square miles.

Ann Arbor's greatest asset is its university, to which have come eminent teachers and experts in practically every field. This town of beautiful homes and fine churches has grown up about the university. The campus is one-quarter mile square. The university property is worth $4,000,000. The student fraternity and sorority houses and such important buildings as the Hill Auditorium, costing $300,000; the Alumni Hall, $190,000; Martha Cook Dormitory, $500,000; Newberry Dormitory, $300,000; Michigan Union, $700,000, and the university Y. M. C. A., add much to the architectural features of the town.

Ann Arbor has eight factories, each capitalized for $100,000 or more. The important manufactures are steel ball-bearings, machinery, pianos, flour, automobile accessories, laces and curtains. The Barton Dam, a mile above the city, and the Argo and Geddes plant together supply 6,000 horse-power a day of smokeless energy by which the factories are run.

The city has nine parks, containing over 120 acres. There are six banks, a Federal building costing $60,000, a Carnegie Library and several smaller ones, two public and a number of private hospitals. Ann Arbor was settled in 1824, and was incorporated as a city in 1851. The water plant is owned and operated by the city. W.M.S.

ANNE (1665-1714), queen of Great Britain and Ireland, famous rather for the events of her reign than for what she herself accomplished. While a woman of pleasing character and much good nature, she had no great force or ability. She was the second daughter of James II, then duke of York, was born at Twickenham, and with her father's permission was brought up in the beliefs of the Church of England. In 1683 she was married to Prince George of Denmark, who never attempted to influence his wife in affairs of state. She was of the type that must be influenced by someone, however, and Lady Churchill, afterwards Duchess of Marlborough, gained such a hold on her as practically to

ANNE

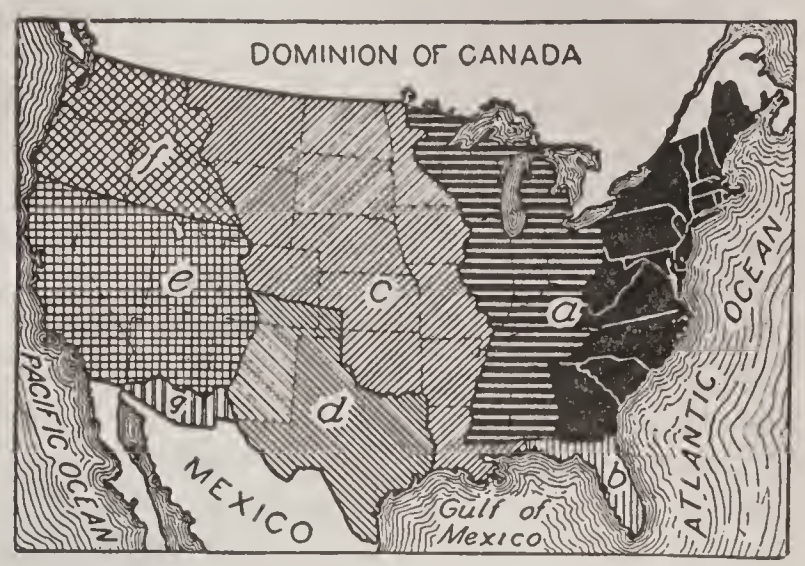
dictate her course. When in 1688 James II was dethroned by William and Mary, Anne was induced by Lady Churchill to support her sister rather than her father, and in 1702 she succeeded William III on the throne. Lady Churchill and afterward Mrs. Masham interfered in all government affairs, and the court was the scene of constant struggles for supreme influence.

The chief event of Anne's reign was the union of England and Scotland, whereby Anne became the first to bear the title of ruler of "Great Britain." During much of her reign, also, the Succession Wars were being waged in Europe; one of these was called in America Queen Anne's War, resulting from the European War of the Spanish Succession (see SUCCESSION WARS). Strange as it may seem, it resulted in France giving up to England practically all of its northern possessions in America. Because of the number of illustrious men who lived and wrote during this period, the reign of Anne is often known as the *Augustan Age;* and indeed such names as those of Pope, Swift and Addison make it worthy of that name.

ANNEALING, the process of gradually heating and cooling to which many articles of metal and glass are subjected, in order to make them less brittle. When metal is cast, rolled into plates or drawn into wire, it acquires a certain brittleness which lessens its usefulness. In general, the more rapidly a metal is cooled, the harder and more brittle it is; slow cooling makes a softer but more tenacious metal. Steel tools, especially those used for cutting, are usually immersed in water, which is first heated and then allowed to cool; this produces extreme hardness. Armor plate and cannon barrels, in which strength is essential rather than hardness, are usually annealed in oil, which cools very slowly. Boiler plates and a few other articles are sometimes allowed to cool in the air.

In the manufacture of glass all the better grades are annealed. The articles, usually arranged on iron trays, are placed in a long furnace, and their temperature is slowly raised almost to the fusing point by drawing them nearer and nearer the fire. They are then slowly cooled by drawing the trays away from the fire. See GLASS; IRON; STEEL; TEMPERING.

ANNEXATION, in international law, the formal process by which a state acquires sovereignty over new territory. Such territory may be unoccupied except by aborigines, in which case annexation marks the establishment of civilized government, merely the closing act of discovery and conquest. If, however,



UNITED STATES ANNEXATION MAP

(*a*) Including solid black and parallel-lined section, original territory after 1783; the solid portion represents the thirteen colonies which fought for independence. (*b*) Purchased from Spain, 1819. (*c*) Louisiana Purchase, 1803. (*d*) Texas annexation, 1845. (*e*) Mexican cession, 1848. (*f*) By discovery, exploration, settlement and treaty of 1859. (*g*) Gadsden purchase from Mexico, 1853.

the territory was a part of another civilized state, annexation implies that the new ruler acquires all rights of ownership and completely displaces the previous sovereign. According to general usage, annexation includes not only the acquisition by one state of territory adjoining it, such as the transfer of Alsace-Lorraine to Germany after the Franco-German War, but also the acquisition of lands far removed from the boundaries of the nation acquiring these new possessions. Examples of the latter are the annexation of the Philippine Islands, Hawaii and Porto Rico to the United States, and of the Boer republics in South Africa to the British Empire.

Annexation may be the result of purchase, of peaceful cession, or of conquest. For the purposes of international law, however, all cessions of territory become annexation, regardless of any pressure brought to bear on the ceding country. When the United States first acquired new territory, the Louisiana Purchase of 1803, there was considerable doubt as to the power of the national government to add to the nation's domain, because no such power was expressly granted by the Constitution. Since then other additions have been made, and the government's right to annex territory is generally admitted as a right which naturally belongs to a sovereign power.

The ownership or sovereignty of some parts of the world is constantly changing; some of the important recent annexations are listed below:

Territory Annexed	Original Owner	Transfer By	Present Owner	Date of Acquisition
Alaska	Russia	Purchase	United States	1867
Alsace-Lorraine	France	Conquest	German Empire	1871
Bosnia-Herzegovina	Turkey	Protectorate	Austria-Hungary	1908
California and New Mexico	Mexico	Conquest	United States	1848
Crete	Turkey	Protectorate	Greece	1913
Cyprus	Turkey	Protectorate	Great Britain	1914
Florida	Spain	Purchase	United States	1821
Gadsden Purchase	Mexico	Purchase	United States	1853
Guam	Spain	Conquest*	United States	1898
Hawaii	Native Kingdom	Republic	United States	1898
Korea	Native Kingdom		Japan	
Louisiana	France	Purchase	United States	1803
Madagascar	Native Kingdom	Protectorate	France	1896
Northwest Terr. (Canada)	Hudson's Bay Co.	Purchase	Canada	
Orange Free State	Boer Republic	Conquest	Great Britain	
Philippines	Spain	Conquest*	United States	1898
Porto Rico	Spain	Conquest*	United States	1898
Samoa	Native Kingdom		U. S. etc.†	
Texas	Mexico	Republic	United States	1845
Transvaal	Boer Republic	Conquest	Great Britain	
Tripoli	Turkey	Conquest	Italy	

*Guam, the Philippine Islands and Porto Rico were ceded by Spain as a result of the Spanish-American War, but the United States paid $20,000,000 to Spain in compensation.

†United States, Great Britain, Germany.

ANNIE LAURIE, *law' ri,* a famous Scottish song, as beautiful and as popular now as when written, in the seventeenth century. William Douglas wrote it of a real Annie Laurie, daughter of Sir Robert Laurie of Maxwelton, with whom he was in love, but its charming lines evidently did not win her affection, for she married another man.

Lady John Scott Spottiswood, an English music writer, loving the old words and feeling that they deserved music as beautiful, wrote in 1836 the tune to which they have ever since been sung, and which has become so much a part of them that the two can scarcely be thought of separately. The first stanza runs as follows:

> Maxwelton's braes are bonnie
> When early fa's the dew,
> And it's there that Annie Laurie
> Gie'd me her promise true—
> Gie'd me her promise true,
> Which ne'er forgot will be;
> And for bonnie Annie Laurie
> I'd lay me doune and dee.

ANNISTON, *an' is tun,* Ala., a progressive industrial city with a population, chiefly American, of 17,734 in 1920, an increase of 4,936 since 1910. It is the county seat of Calhoun County, situated in the northeastern part of the state, on the Southern and the Louisville and Nashville railways. Birmingham is about sixty-three miles southwest, Atlanta 104 miles east, and Montgomery 148 miles south. The city was founded in 1873 by the Woodstock Iron Company and was incorporated as a city in 1885. Its name was received from the wife of one of its founders, whose name was Annie. The area of the city is about nine and one-half square miles.

Locally, Anniston is known as the Model City and is located in the midst of a natural park, sheltered by the Blue Ridge Mountains. Pulpit Rock, the loftiest peak, 2,400 feet, and the highest point in the state, is plainly in view from the city. It is also called the City of Churches, on account of the number and unusual architectural beauty of its religious buildings; of these, the Church of Saint Michael and All Angels is the most notable. Anniston College, for women, the Alabama Presbyterian College, for men, the Noble Institute, for both sexes, the Barber Memorial Seminary for colored girls, a normal school and

a high school, offer unusual educational advantages for a city of its size. The Federal building, erected in 1905 at a cost of $150,000; the courthouse, which cost $75,000, and a $100,000 hotel are buildings worthy of mention. These, with the many industries of cast-iron pipe, cotton mills, car works, ordnance works, machine shops, steel products and pig-iron furnaces, testify to the progress and activity of the city.

The character of its industries is due to its location; it is in one of the most important coal and iron mining regions of the United States. The product of cast-iron pipe is 200,000 tons annually and 25,000 bales of cotton are annually consumed by eight cotton mills. Valuable timber tracts in the vicinity are the source of an important lumber business and the cotton and agricultural products are large. M.C.K.

ANNIVERSARIES, *an i vur' sar riz,* **FOR CELEBRATION.** There are certain days of the year that have a special meaning because they are the anniversaries of events that have influenced the history of the world. Such dates are the birthdays of the world's great men, and the anniversaries of decisive battles or of deeds that have made history. In the articles in these volumes descriptive of the months of the year will be found hundreds of dates of anniversaries selected with a view to their fitness for celebration. To these the reader is directed.

ANNUALS, *an yu' als,* plants which spring from the seed, blossom, produce fruit and die, all in one year. They are distinguished from *biennials,* which take two years to complete their life's course, and from *perennials,* which live indefinitely instead of dying when their fruit has been produced. For the most part annuals are natives of fairly dry places, but they have been introduced into all climates, and afford some of the most useful as well as ornamental of plants. Thus the pea, the bean, the tomato, the nasturtium and the sweet pea are all annuals, and must be raised from seed each year. In climates which have a cold winter there is danger of confusing annuals with biennials or perennials, which die down to the ground at the close of the growing season. Thus the carrot is a biennial, though it shows no more life during the winter than a dead tomato plant. See BIENNIALS; PERENNIALS.

ANNU'ITY, from the Latin *annus,* meaning *year,* is a sum of money paid annually, but not to be confused with *interest.* A person usually is said to buy an annuity; that is, he pays a certain sum as consideration, in return for which some other person or company agrees to pay him or his heirs an annuity. The lump sum necessary to secure a certain annual return is determined by rules and principles which have been the subjects of careful investigation. If the annuity is to be perpetual, the present value will evidently depend upon the rate of interest on money; if the annuity is to be for life, the present value, obviously, is dependent upon not only the rate of interest, but the number of years the beneficiary will live, which in turn depends upon age, sex, climate and other influences. In some European countries the granting of annuities is conducted by the government; in the United States the purchase of annuities is not nearly so common a practice as in Europe. Its place is taken largely by life insurance, which, obviously, is exactly opposite in character, the difference being that small annual payments are made, with the agreement that at a certain time a lump sum will be paid to a designated beneficiary.

Under the title MORTALITY, LAWS OF, a table of probable length of life is given.

ANNUNCIATION, *a nun' si a shun,* THE, the title of several famous paintings which picture the angel Gabriel announcing to the Virgin Mary that she has been chosen to be the Mother of Christ. The story, a favorite with religious painters, is told in *Luke* I, 26-38. The Virgin is usually shown with a book or needlework; the angel bears a lily or an olive branch, for thus the early legends represented these characters. Many master artists have been attracted by the subject of the Annunciation, and their treatment of the story is reverent and exalted; the paintings have always the spirit of peace, harmony and mystery. Well-known paintings bearing this title are those by Andrea del Sarto (Pitti Gallery, Florence); Fra Angelico (Church of San Marco, Florence); Titian (Venice); and Dante Gabriel Rossetti (National Gallery, London). In the latter the Virgin is a portrait of the artist's sister, Christina Rossetti. See PAINTING.

ANNUNZIO, GABRIELLE D', *dahn noon' dze o,* (1864-), an Italian poet, novelist and dramatist, the foremost literary personage in Italy at the beginning of the twentieth century. In 1915 his written and spoken appeals to his countrymen were the chief factors in rousing their feelings against Austria and Germany, thus plunging Italy into the War of the Nations. This intense nationalism was in striking contrast to d'Annunzio's early philosophy

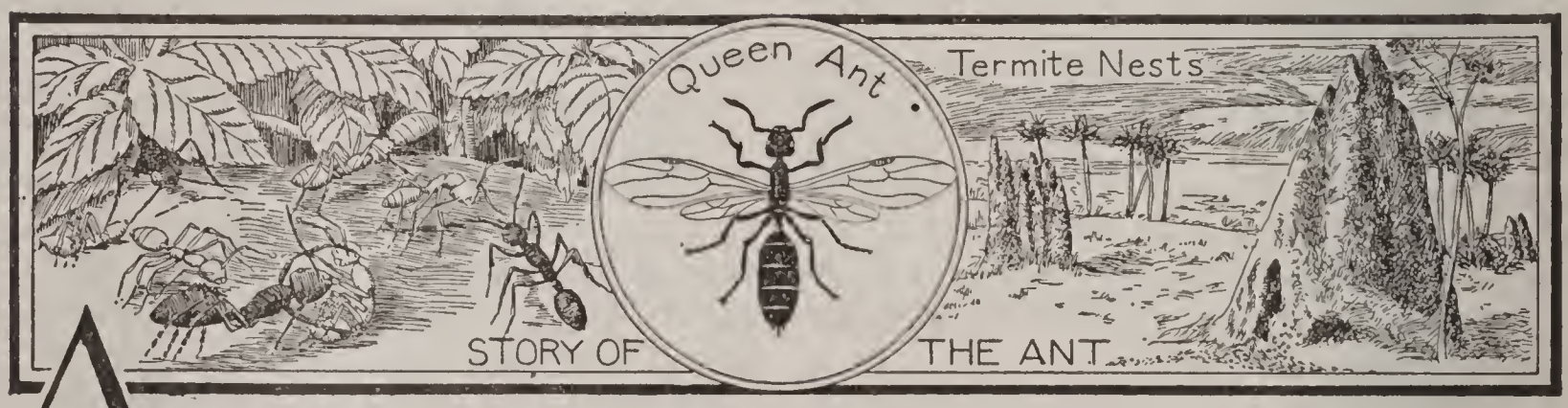
of life. After the peace conference denied Fiume to Italy he occupied the city for a time with troops as a protest against the decision of the powers. Though he was born and educated in Italy, his early literary works were French in spirit, and strongly showed the influence of Maupassant, Paul Bourget and Tolstoy. They were, to a large extent, psychological studies, pessimistic and occasionally frank beyond the point of propriety.

Of his novels the most important are *The Child of Pleasure, The Intruder, The Triumph of Death, Virgins of the Rocks* and *The Flame of Life*. His plays are mostly lacking in action, and have not been very successful on the stage; the best of them are *Francesca da Rimini, The Daughter of Jorio, The Martyrdom of Saint Sebastian,* a mystery play, and *The Dead City,* written for Sarah Bernhardt.

ANSONIA, Conn., is in New Haven County, in the southwestern part of the state. It is twelve miles west of New Haven, on the east bank of the Naugatuck River, and on the Berkshire and Naugatuck divisions of the New York, New Haven & Hartford Railroad. The city has electric interurban service. The population in 1910 was 15,152; in 1920 it had increased to 17,643.

Ansonia was founded in 1840 by Anson Green Phelps, and named in his honor. A public library, built as a memorial to his memory by his granddaughter, Caroline Phelps Stokes; the city hall; opera house; Y. M. C. A. building, and a concrete bridge constructed at a cost of $175,000, are the interesting features of the town. Ansonia was at first a part of the township of Derby; it was incorporated as a separate township in 1889 and became a city in 1893.

The important manufactured products of the city are heavy machinery, brass and copper goods, woolen goods, clocks, electrical appliances, etc., valued at $50,000,000 a year.



Ant. "Go to the ant, thou sluggard," wrote Solomon thousands of years ago; "consider her ways and be wise; which having no guide, overseer, or ruler, provideth her meat in the summer and gathereth her food in the harvest." And Shakespeare put into the mouth of his delightful fool in *King Lear* the words, "We'll set thee to school to an ant, to teach thee there's no labouring i' the winter."

There is a significance about these references, made many centuries apart, both before the days of systematic nature study. They show that the ant has always attracted attention; not by reason of beauty, like the birds and butterflies, nor because, like the bee, it furnishes man with a delicious food; but because its activities suggest in so many ways those of human beings. In general it is the higher animals in which man is most interested—those which are structurally not unlike himself; but the ant is an exception to this rule because it shares with man one dominant trait—it is a strongly social being.

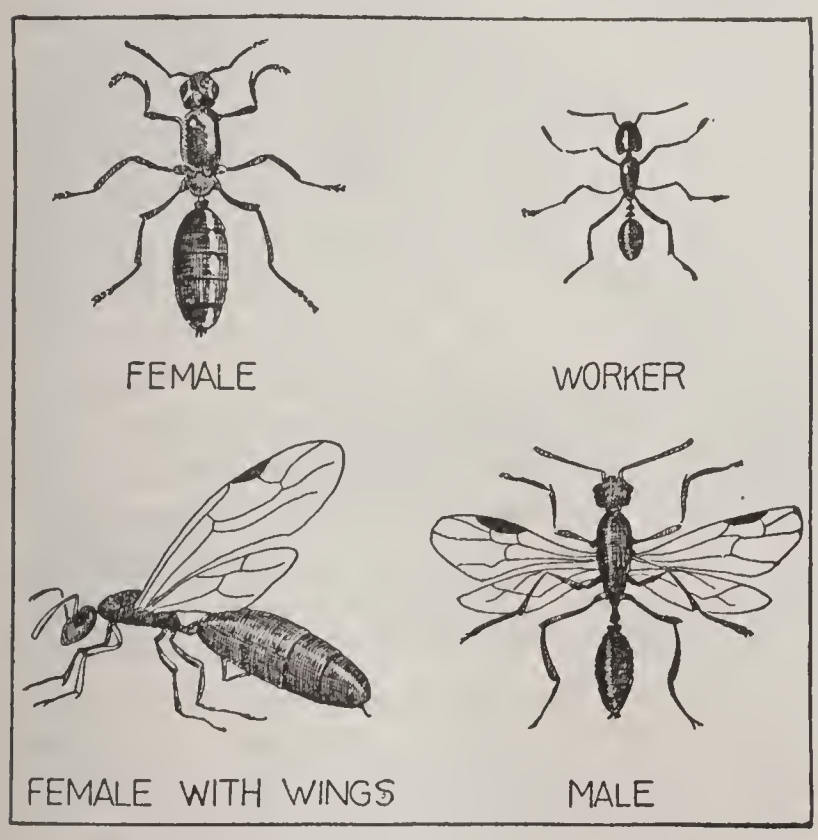
Rank in Insect World. Like the bees, with which they have many characteristics in common, the ants belong to the great order of membrane-wings, or *Hymenoptera,* and by some students of insect life they are classed at the very top. This does not mean that they are more intelligent or more capable than all other insects. The social bees, for instance, display fully as much ingenuity and build far more elaborate homes for themselves; but next to man ants are the most adaptable form of animal life in the world. Like man, they have found their way everywhere. No region is too hot or too cold, too dry or too moist to meet their demands. Originally flesh-eaters, many species have so far adapted themselves to conditions that they can live and thrive on plant food; and just because of this they can maintain large colonies. For in all ranks of animal life the flesh-eaters are inclined to be solitary, partly because their preying instinct makes them savage, but chiefly because animal food is nowhere certain enough and plentiful enough to furnish unlimited supplies.

Nor is this the only way in which the ants show their adaptability. They can endure astonishingly wide temperature changes with-

out apparent suffering, merely digging themselves deeper into the ground when extremes of heat or cold are to be guarded against. Neither drought nor flood, unless too long continued, can destroy their communities, and even food scarcity can be endured for a time. The female, indeed, can store up within her body enough food so that she does not need to eat for the greater part of a year. No wonder then, that ants are the "dominant" insects, and that, as some authorities hold, reptiles have developed scales, caterpillars hair and animals fur, partially as defenses against the everywhere-present little creatures.

Ants establish more lasting communities, too, than do any other of the lower animal forms. A beehive may keep its tenants indefinitely, but they are not the same tenants, for bees are short-lived, the queen living but three years, or thereabouts, and the workers but a few weeks. The worker ants, on the other hand, live from four to seven years, and it is nothing unusual for a queen to attain the age of fifteen years.

The Three Classes. In studying ants, one is constantly reminded of the closely related bees, and one of the fundamental resemblances consists in the number of life-forms. For among the ants, as among the bees, there are not only males and females, but workers, or neuters, as well. These last are but undeveloped females, for the most part sterile, but occasionally able to perform the important function of laying eggs. The workers are by



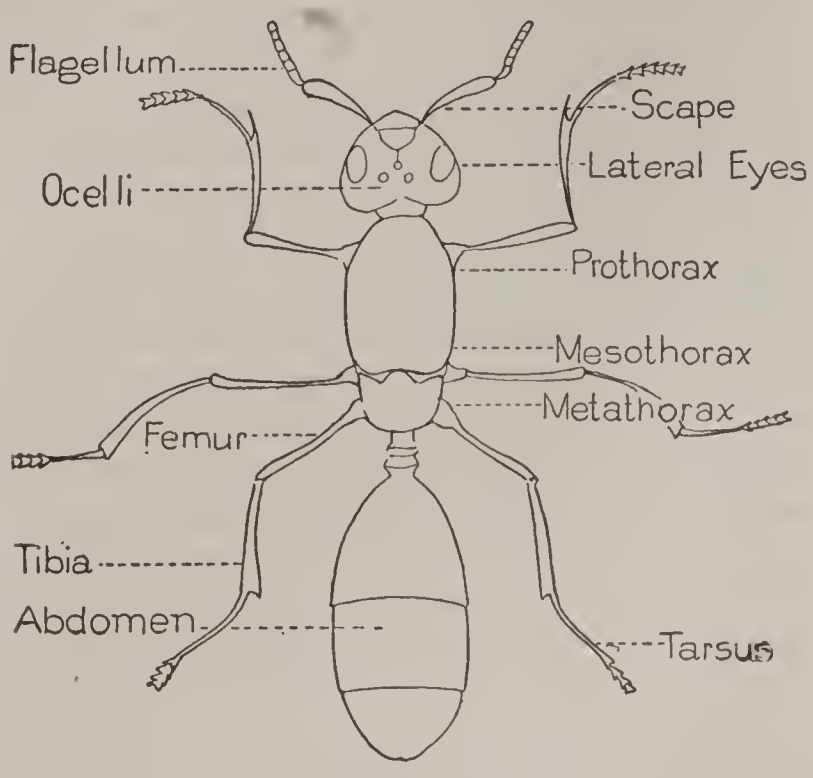
far the most numerous class, though each ant-community has a number of females, and not just one queen, as do the bees. The females are practically always winged, and usually the males, but the workers, which are the smallest members of the colony, are wingless. There is no romance for them; no flight into the air. They are born to work, and they remain faithful to their tasks until they die and are carried out of the nest. The males, on the other hand, do no work, and their life-period is short, for the ants are too careful economists to support for a long time any parasitic members.

Parts of an Ant. Since it is impossible to go anywhere without finding ants of some species or other, everybody can recognize them at sight. The most noticeable distinguishing mark is the sharp differentiation between head, thorax and abdomen—in some species so pronounced that it seems strange that the ants do not actually break in two. It will be of interest here to find out a little more about the parts of an ant—a few of the facts that can be discovered best by means of a microscope.

The outer covering of ants is tough and horny, in some species shiny, in others dull and ridged. One of their chief cares is to keep this horny covering spotlessly clean, and much time is spent in the nest in polishing each other with antennae and with tongue. In the accompanying diagram the various parts are clearly shown. First, there are the eyes—very curious and interesting organs. If examined under a microscope, each of these "lateral eyes," as the diagram calls them, is seen to be made up of a group of little lenses, or facets, fitted into each other like a honeycomb. Now, ants cannot turn their eyes about to the right or left, but each lens enables them to see in a slightly different direction, so that altogether they gain a fairly good all-round view. These compound eyes are not the only ones possessed by ants, for many of them have, on the top of their heads, three *ocelli,* or little eyes. But with all this provision ants do not really see well. Why should they, when most of their time is spent underground, in darkness?

If eyes, however, are of no use to an ant in its home environment, the same cannot be said of the other sense organs, the *antennae,* or *feelers.* These exceedingly delicate "horns" are fitted into little sockets at the front of the head, and are moved to and fro with great rapidity when the ant is exploring or finding its way in the dark. The antennae are not organs of feeling merely; in some way not

understood they are organs of smell as well, and many a time when an ant seems to be guided by its eyesight it is really dependent on its sense of smell. In the diagram the word *antenna* does not appear, but the two



PARTS OF AN ANT

parts of it are named; the jointed part, which looks like a string of little beads, is called the *flagellum,* and the *scape* is the unjointed part.

The other names in the diagram may at first look forbidding, but a very little study will make them clear. *Femur, tibia, tarsus*—those terms are familiar to anyone who has the slightest acquaintance with anatomy, for in human beings they are the names given to the thigh-bone, the lower bone of the leg, and the instep, with its many small bones; a glance at the illustration will show that they are used for corresponding parts of the ant's anatomy. The three names which relate to the thorax are very simple when it is understood that *pro* means *fore,* or *front; meso* means *middle,* and *meta* means *hind,* or *after.*

The *mandibles,* or jaws, are not shown in the illustration, but they are by no means unimportant in the ant's scheme of things. Numerous indeed are the parts these mandibles are called on to play; they serve as hands, for the carrying of prey or other burdens; as spades, as saws, as swords, as knives and forks —as any sort of implement or weapon, in fact, of which the ant has need.

How Ants Live. All this, while interesting enough, is only preliminary to the really fascinating question of the home-life of ants. To be sure, all ants have not the same nesting habits, any more than all birds; but of the 5,000 or more species that have been described, all are social—that is, they live in colonies. Most numerous of the ants in temperate regions are those that make their nests in the ground, and their mode of life will be described here in some detail.

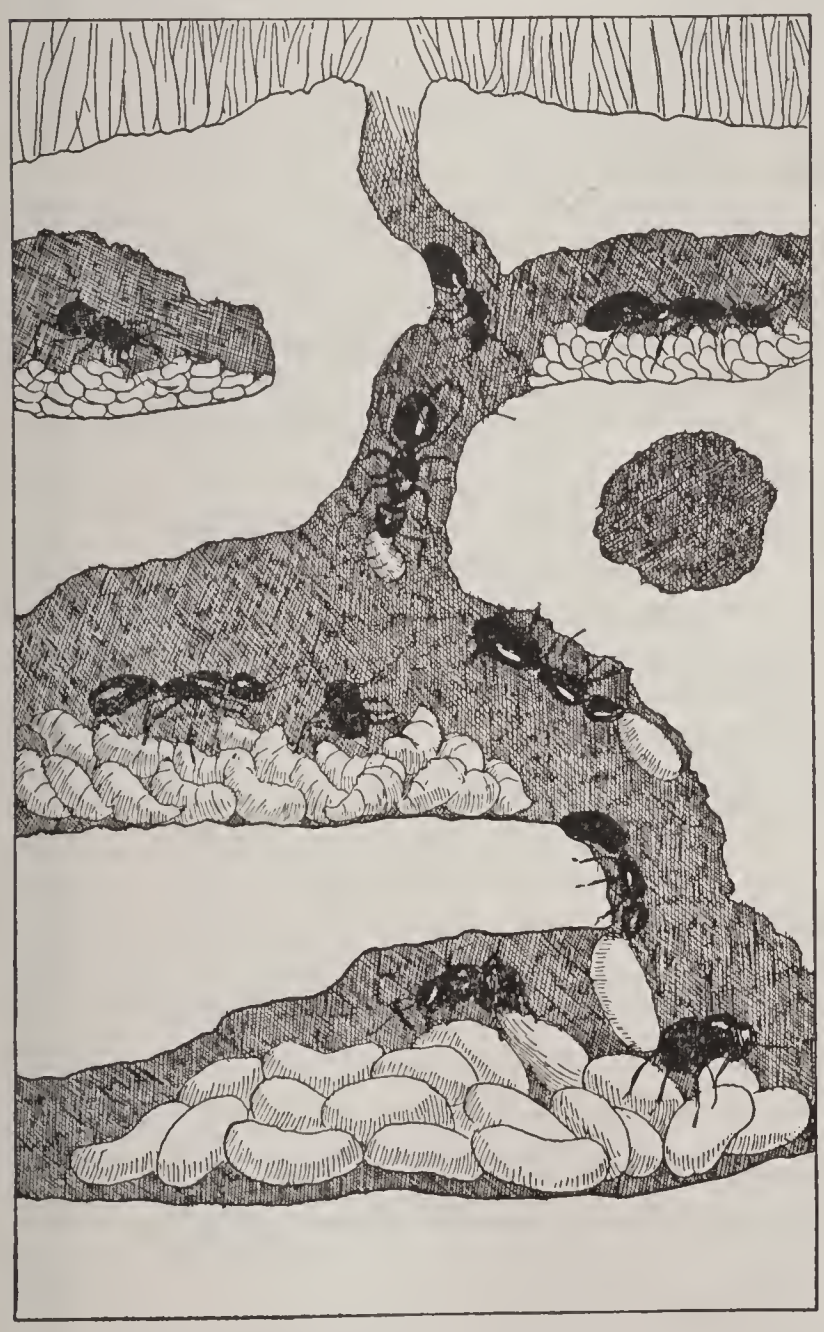
The Nuptial Flight. Let us suppose that we are watching an old, well-established community on a bright summer day. Some of the workers are busy about their regular tasks, but many of them are running excitedly to and fro, darting into the hole and then out with no apparent purpose. Suddenly something happens. Out of the hole with a rush come the gauzy-winged males and females, called forth not only by the warmth of the sun but by some mysterious instinct which tells them that mating time has come. Up and up they fly, until they are lost to sight and only the strongest males are able to overtake the fleeing queens. High in the air the mating takes place; and then the joyous hour of flight and romance is over, and both return to humdrum, earthy life. The male dies almost immediately, and the female, realizing that never again will she need her delicate wings, tears them off or rubs them off.

The New Colony. Some of the queens are captured by the workers and borne back to the communities from which they came, but others found new colonies. The wingless queen, who has never done any real work in her life, now digs for herself a little burrow in the soil, perhaps wearing away her mandibles and maiming herself for life. Having hollowed out a small chamber at the lower end of the burrow, she closes the opening completely, and remains underground, without food, for month after month. The first eggs she lays become in time tiny legless grubs, or *larvae,* which are perfectly helpless and must be cared for by the queen. She feeds them with secretions from her own body, until very slowly they pass to the next stage, becoming cocoons, or *pupae.* These in time become worker ants, perfectly formed but very small—*minims,* they are called; and the queen's days of caring for her offspring are then over, for the little workers relieve her from all her tasks, save that of egg-laying.

The Nest. They dig a real nest, with branching galleries leading to chambers of various sizes, and there then appears the opening at the surface of the soil and the familiar crater-shaped ant-hill, formed of the tiny pellets of soil which are brought to the surface. In some of the chambers food is stored; in others are

placed the eggs and the larvae and pupae as they develop. There is a regular scheme of distribution of these, depending apparently on temperature and moisture. The duties of the workers are not finished when they have placed their charges, for the queen and the larvae must be fed, and the young in all stages must be kept strictly clean. Many workers spend most of their time polishing the eggs and the larvae with their tongues, while others take the part of nurse-maids and carry the young about. In the evening, after a hot day, long trains of workers can often be seen, bearing in their mandibles the little white bodies which are usually mistaken for eggs, but which are in reality larvae and pupae. Sometimes these are deposited on the ground and allowed to remain there, but often they are borne to and fro by their careful nurses, like children out for an airing.

Just here a word of caution is necessary. There is always the danger in studying about



NEST OF THE COMMON ANT

any form of animal life that actions may be over-interpreted; that the enthusiastic observer may argue that because men when they act in certain ways are moved by certain feelings, like actions in animals are to be accounted for by similar impulses. To be sure, the ants show what appears to be the tenderest affection for their charges, but their movements are governed by unreasoning instinct and not by conscious solicitude. Many an observer has been so misled, and has written tales of the joy of ants on meeting after a long separation or of their grief over their dead, and of the elaborate funeral ceremonies—tales which seem too good to be untrue, but which nevertheless must be cast into the realm of fable.

Ant Food. As stated above, the earliest ants ate only flesh-food, and there are many species which still hold to this original preference. Young naturalists have a clever way of taking advantage of this fact when they have some small animal, as a mouse or a bird, which they wish reduced to skeleton form. If a populous ant nest be chosen, and the little animal be left close enough so that it cannot be overlooked, it does not take long for the perfectly clean skeleton to appear. Ants will also empty birds' eggs if the shells are not too tough.

But a great many species of ants have progressed beyond this hunting stage, where the whole business of life is foraging for prey, and are living in what might be called a pastoral or agricultural state. Some of them keep herds of "ant cows" and "milk" them in most approved fashion—"cows" which are nothing more than plant lice, known as *aphides,* that secrete a sweet juice (see APHIDES). The lice are "pastured" on some plant and the ants stand guard over them, going about from one to another and stroking them with their antennae until they yield a clear drop of fluid, which is eagerly swallowed.

Others collect seed or even grain and store it in their nests, where it is kept scrupulously clean. Certain observers, noticing about the nest of seed-eating ants circles of growing plants, have declared that the ants actually planted seed and lay in wait for the harvest, but more careful study reveals the fact that the plants have sprung up from seed accounted useless by the ants and cast out of the nest. Then there are the interesting fungus-eating ants, which go about securing their novel food supply in systematic manner. Each foraging worker returns to the nest bearing a leaf, which is carried by the stem, with the blade extending over the ant's back. So suggestive is the appearance that these ants are commonly known as *umbrella,* or *parasol,* ants, but it is

OUTLINE AND QUESTIONS ON THE ANT

Outline

I. Parts of the Ant

(1) Head
  (a) Lateral eyes
  (b) Ocelli
  (c) Antennae
  (d) Mandibles
(2) Thorax
(3) Abdomen
(4) Legs
(5) Wings of males and females

II. Classes of Individuals

(1) Male
  (a) Usually winged
  (b) Does no work
  (c) Short-lived
(2) Females
  (a) Largest form
  (b) Winged
  (c) Lays all eggs
(3) Worker or neuter
  (a) Undeveloped female
  (b) Smallest form
  (c) Most numerous
  (d) Does all work
  (e) Wingless

III. Rank Among Insects

(1) Intelligence
(2) Adaptability
  (a) To climatic conditions
  (b) To food supply
(3) Length of life

IV. Mode of Life

(1) All species social
(2) Plant-dwellers
  (a) Nests in dead trees
  (b) Nests in living plants
(3) Soil-dwellers
  (a) Manner of nest
    1. Galleries
    2. Chambers
  (b) Mating
  (c) Founding new colony
    1. Queen's part
    2. Workers' part
  (d) Regular tasks
    1. Keeping nest clean
    2. Securing food
    3. Feeding young
    4. "Nurse-maids"

V. Development of Young

(1) Egg
(2) Larva
(3) Pupa
(4) Young ant

VI. Choice of Food

(1) Flesh-eaters
(2) "Pastoral" ants
  (a) Plant lice kept as "cows"
(3) Seed-eaters
(4) Fungus-eaters

VII. Relation to Man

(1) Effect on soil
(2) Help in decomposition of animal matter
(3) Wood-gnawing
(4) Harm to plants from pastured lice
(5) Enemies of vermin

VIII. How to Study Ants

(1) Making a formicary
(2) Necessity for darkness
(3) Furnishing food
(4) Furnishing "cemeteries"
(5) Use of magnifying glass

Questions

What reason is there for considering the ant as the highest type among the insects?

Are there solitary ants, as there are solitary bees?

What is a *formicarium?*

The first three stages in the life of the race are generally spoken of as the hunting, pastoral and agricultural stages. Is there anything in the ant world to correspond to these?

In what ways does the ant resemble man in its mode of life?

Why are ant communities more lasting than those of any other insect?

Is there perfect social equality among ants, or is there always an inferior class?

Outline and Questions on the Ant—Continued

How many kinds of individuals are to be found in each ant colony?

Which is the longest lived? The shortest lived?

Has an ant more or fewer eyes than a man?

What did all ants originally eat?

Why has their broadening taste made possible larger communities?

Does the female ever do any work? The male?

What are the little white burdens which the workers sometimes bring to the surface of the soil?

What function do the *antennae* fulfil?

What are the three divisions of the thorax called?

What connection have ants, according to some authorities, with the fact that reptiles have scales?

To what other insect is the ant closely related?

What is the meaning of the name of the order to which both belong?

Are ants widely spread over the earth or restricted to a few places?

Give several proofs that the ants are thoroughly sanitary in their home life.

What is the most noticeable difference between the workers and the other two classes of ants?

Why is it wise to use a red light when examining ants in a temporary nest?

Why does the eye of an ant have more than one lens, or facet?

What are the two parts of the antenna called?

What three names, used in human anatomy, are applied to the three parts of the leg of an ant?

Which are an ant's most delicate sense organs?

About how many species of ants have been described?

Why does the female tear off her wings?

How is the queen supplied with food after she has shut herself up in her burrow to begin a new colony?

What are the first little workers that hatch out called?

To which class of ants does the institution of slave-holding really do harm?

How do the ants repay the acacia tree for the board and lodging furnished them?

Into what error have sympathetic observers of ants frequently fallen?

Are the young in their various stages of development kept jumbled together in the nest?

To what characteristic of the ant do most literary allusions have reference?

Is an ant's skeleton on the inside or the outside?

What is the origin of the "gardens" which sometimes grow about ants' nests?

Which ants are called the "Huns and Tartars of the insect world"?

What is their method of crossing a stream?

Do the slave-holders capture full-grown ants and force them into servitude?

What effect does the nest-digging have on the soil?

Is the farmer who grows corn glad to have colonies of black ants in his fields?

What special provision does the acacia described by Belt make for its ant-guests?

Why are the ants that live on fungi commonly known as *parasol* ants?

What is a neuter?

Where is the ant's sense of smell located?

In what way can the amateur naturalist profit by the presence near his home of an ant-community?

What functions have the mandibles?

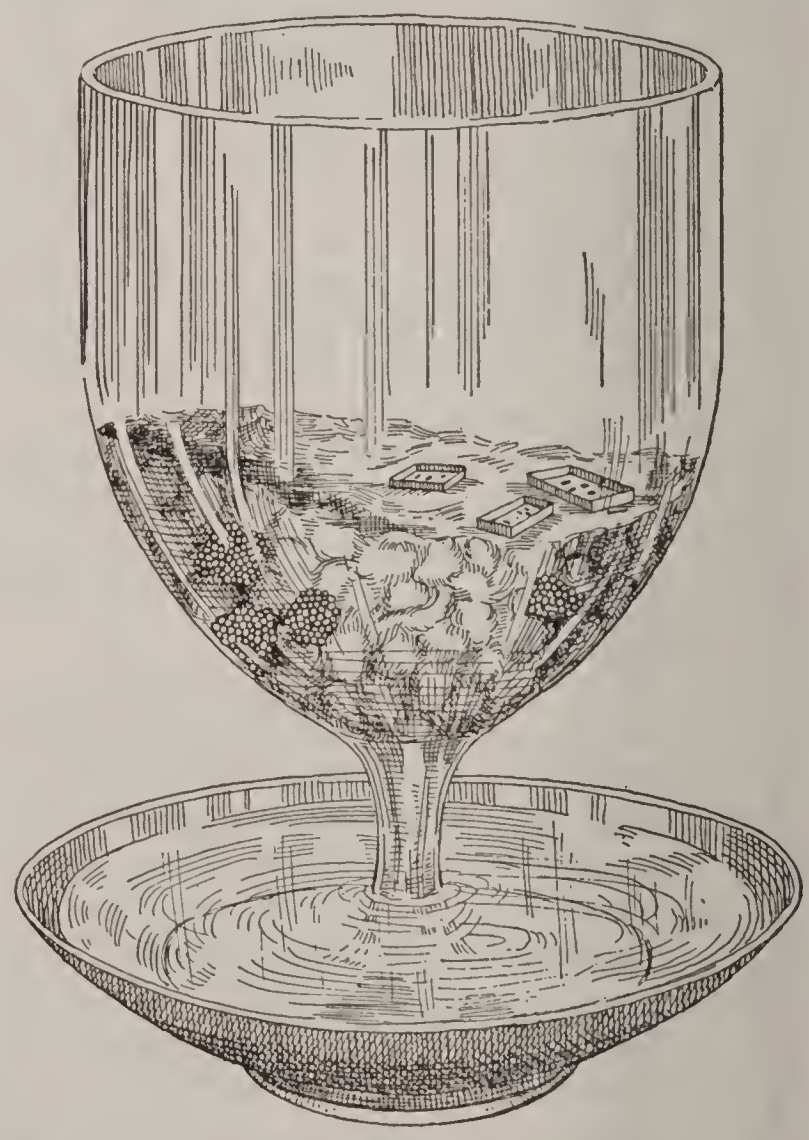
not as a protection that the leaves are wanted. Once in the nest, the leaves are cut by the jaws of the ants into tiny pieces, and on the molding heap so formed grow fungi, the favorite food of these ants. The heap is kept very clean, so that no bacteria ever grow upon it.

Certain ants, particularly in the tropics, depend on plants not only for food but for dwelling places as well. The rotting stump of a tree, the hollow stem of a weed, or the capacious trunk of a tulip tree affords them a comfortable home; but perhaps the most attractive type of plant home is that described by Thomas Belt in his *Naturalist in Nicaragua*.

One low tree, very characteristic of the dry savannahs, is a species of acacia, growing to a height of fifteen or twenty feet. The branches and trunk are covered with strong curved spines, set in pairs, from which it receives the name of the bull's-horn, they having a very strong resemblance to the horns of that quadruped. These horns are hollow, and are tenanted by ants, that make a small hole for their entrance and exit near one end of the thorn, and also burrow through the partition that separates the two horns; so that the one entrance serves for both. Here they rear their young, and in the wet season every one of the thorns is tenanted, and hundreds of ants are to be seen running about, especially over the young leaves. These ants form a most efficient standing army for the plant, which prevents not only the mammalia from browsing on the leaves, but delivers it from the attacks of a much more dangerous enemy—the leaf-cutting ants. For these services the ants are not only securely housed by the plant, but are provided with a bountiful supply of food; and to secure their attendance at the right time and place, this food is so arranged and distributed as to effect that object with wonderful perfection. The leaves are bipinnate. At the base of each pair of leaflets, on the midrib, is a crater-formed gland, which, when the leaves are young, secretes a honey-like liquid. Of this the ants are very fond; they are constantly running about from one gland to another to sip up the honey as it is secreted.

But this is not all; there is a still more wonderful provision of more solid food. At the end of each of the small divisions of the compound leaflet there is, when the leaf first unfolds, a little yellow fruit-like body united by a point at its base to the end of the pinnule. Examined through a microscope, this little appendage looks like a golden pear. When the leaf first unfolds, the little pears are not quite ripe, and the ants are continually employed going from one to another, examining them. When an ant finds one sufficiently advanced, it bites the small point of attachment; then, bending down the fruit-like body, it breaks it off and bears it away in triumph to the nest. All the fruit-like bodies do not ripen at once, but successively, so that the ants are kept about the young leaf for some time after it unfolds. Thus the young leaves are always guarded by the ants; and no caterpillar or large animal could attempt to injure them without being attacked by the little warriors. The fruit-like bodies are about one-twelfth of an inch long, and are about one-third of the size of the ants; so that the ant bearing one away is as heavily laden as a man bearing a large bunch of plantains. I think these facts show that the ants are really kept by the acacia as a standing army, to protect its leaves from the attacks of herbivorous mammals and insects.

Studying Ants. Many forms of animal life which it is interesting to read about cannot be studied at close range, but this is not true of ants. With very little trouble anyone may observe for himself the habits of these little creatures. The materials needed are simple—



A FORMICARIUM

A simple suggestion for a temporary home for ants while they are being studied.

an ordinary tumbler, a saucer or plate, and, if possible, a small magnifying glass which may be purchased for fifty cents.

Into the tumbler put part of an ants' nest, such as may be found in any open, sandy stretch. The tumbler should be about half full, and as many of the ant colony as possible should be included. Then place the tumbler in the plate or saucer and pour water around it, or your ant visitors may have escaped by

the next morning. This nest with which you have provided the ants—indeed, any ants' nest—is called a *formicarium,* or *formicary,* from the Latin word *formica,* meaning *ant.* It still differs in one important particular from a true ants' nest, for that, being underground, is in total darkness; and total darkness is very grateful to ants. Wrap a dark cloth, therefore, around your tumbler, and remove it only when you wish to make your observations. There is one curious fact about ants' sensitiveness to light—it disappears in the case of red light, to which they seem almost totally blind. If, therefore, you can take your formicary for study into a room with a red light, you will disturb the little inhabitants far less than if you subject them to untempered sunlight.

Probably, in taking up the material for your formicary, you have included no food, so it will be necessary for you to "board" your visitors as well as house them. Bread crumbs, broken rice, a little honey or sugar or a crumbled nut meat or two will prove quite satisfactory to them. Something else, also, you may provide them with—something which the old-time observer with his over-interpretation of facts called cemeteries. An ant community is kept strictly sanitary, and no refuse of any sort is allowed to accumulate in the chambers or galleries. Thus the bodies of dead ants are carried out immediately, and if you will place on the nest a paper box about an inch square and a quarter of an inch in height you will find that it will probably be made use of as a repository for the dead.

Watching closely, you may see the worker ants reconstructing the nest which has been disturbed in process of transference to the glass. Winding avenues and spreading chambers will appear, and you may know that the part of the soil which you cannot see is tunneled in the same manner. You may occasionally see, too, the larvae and pupae brought up to the air and warmth; and if you have been fortunate enough to take up with the nest all three kinds of ants, you may discover with your magnifying glass the winged males and females. No matter how long and how carefully you watch, however, you will never see an ant with wings doing any sort of work.

Beneficial or Harmful? Nobody doubts that earthworms really do good by stirring up the surface soil, but seldom are the ants given credit for any such helpfulness. They are, however, valuable in much the same way, and they are useful also in hastening the decomposition of organic matter. One large colony it was estimated, brought into the nest daily about 100,000 dead insects. But not all ants do more good than harm. Many a garden spot has been rendered unattractive by their nests; many a house has suffered real damage from their gnawing. Perhaps the most troublesome habit of the ants, however, is that of pasturing plant-sucking insects. The common black ant is very fond of the fluid secreted by the corn-root louse, and does not trust to chance to find it. Collecting all the eggs it can, it bears them to its nest, and there cares for them during the winter and until the young hatch out in the spring. These young lice it carefully places on the roots of the corn, where they may do great harm to the farmer's prospects.

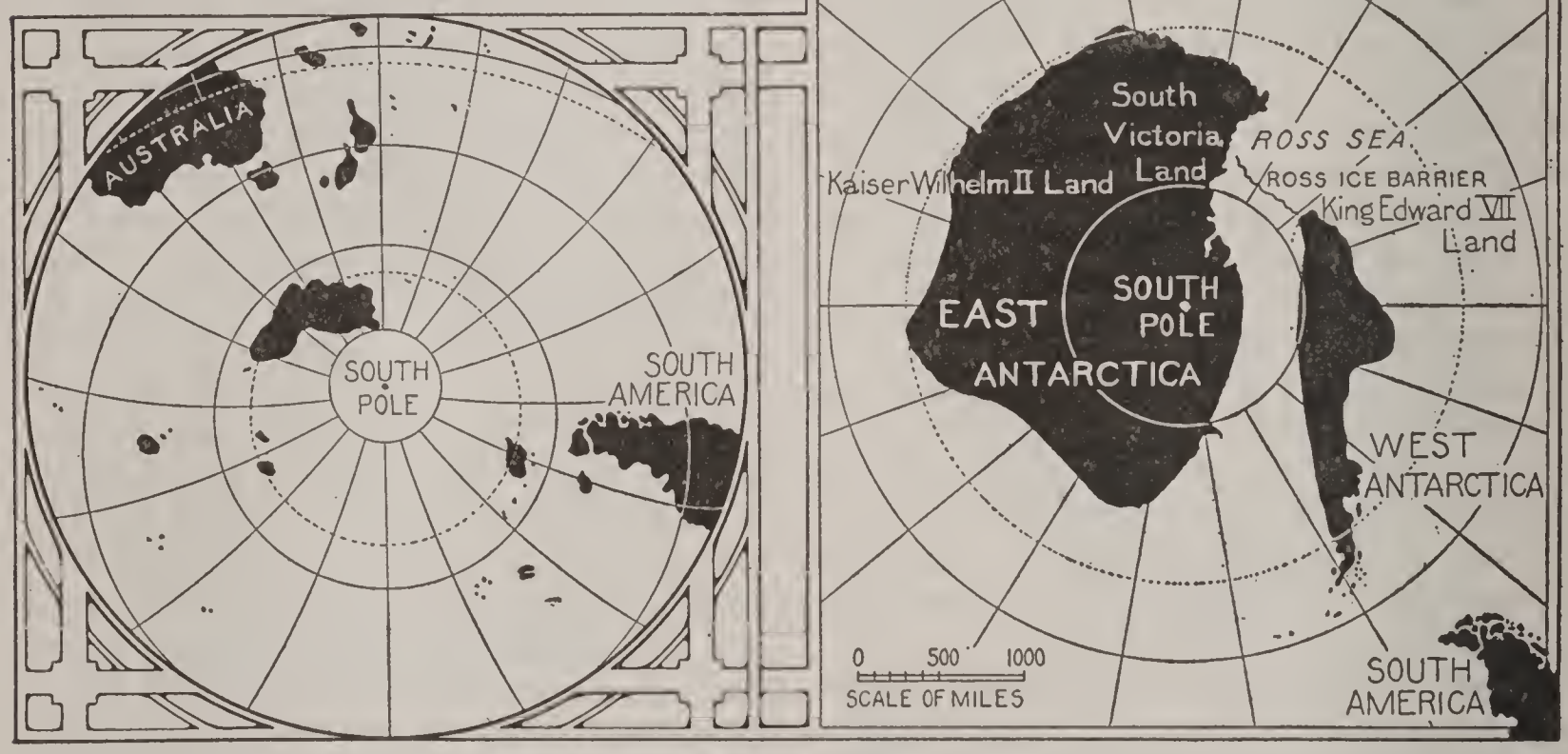
Further Interesting Facts. One of the most curious things to be observed in connection with some species of ants is their habit of keeping slaves. From some nest not far from their own they capture eggs, larvae and pupae, which they care for until these have developed into full-grown ants. Then the "nurses" cease their labors, and the "foreign" ants are compelled to do all the work. But it is the slave-holders and not the slaves who suffer from this custom, for the lazy captors lose in time all capacity for work and become degenerate.

Much has been told about the wonderful customs of the driver ants—those "Huns and Tartars of the insect world" which do not hesitate to prey on animals thousands of times larger than they are. Sometimes, in the tropical or subtropical regions in which they live, they invade a house, and promptly all vermin take leave. Bugs, mice, even the largest and fiercest rats, dare not enter into contest with them, and thus far the householder is the gainer. But the cure speedily proves worse than the disease, for the ants infest everything. Beds may be placed with their legs in pans of water, but the little pests drop down from the ceiling. It is these driver ants which form the living bridges so often referred to, clinging to each other with feet and mandibles until there is a chain long enough to reach from one side to the other of a stream. V.L.K.

This article has been able merely to touch on the outstanding points in this fascinating subject. The reader who is sufficiently interested to desire further information will find W. M. Wheeler's book on *Ants* most helpful.

ANTANANARIVO, *an tan an ar i' vo,* the older form of the word TANANARIVO (which see).

ANTARCTIC, *ant ark' tic,* **CIRCLE,** an imaginary circle parallel to the equator, 23½° north of the South Pole. The name is derived from the Greek words meaning *opposite the bear,* in allusion to the Great Bear, the most conspicuous constellation within the Arctic regions (see BEAR, GREAT). Polar conditions of climate exist considerably north of the Antarctic Circle, though it is usually considered the northern limit of the Antarctic Ocean. When the sun reaches the Tropic of Capricorn on its southward journey, the regions south of the Antarctic Circle have no night. When on the Tropic of Cancer, the limit of its northern progress, darkness prevails in that desolate area, which thus has six months day and six months night in the year. The Antarctic Circle is represented in the map on this page by the dotted line.



ANTARCTIC LANDS AND SEAS

To the left is the map of the region as it was known before the adventurous explorations of Amundsen and Scott. The map at the right pictures the known lands in 1917.

ANTARCTIC, *ant ark' tic,* **LANDS AND SEAS,** the part of the earth which surrounds the South Pole. Strictly considered, this region is bounded by the Antarctic Circle (which see), but in a wider sense it includes the entire area in which Antarctic influences are felt. This area extends to latitude 60° and in some sections to latitude 50°. Great ice fields drift northward as far as Cape Horn and beyond, and single icebergs float even farther.

The Lands. The remoteness of the Antarctic region from Europe, the home of the early explorers, for centuries prevented its exploration, and it is only in the twentieth century that rumor and imagination have yielded to knowledge. It is now known that there is a vast Antarctic continent, but its area is yet the merest surmise. It may be as large as Australia; it may be slightly larger. A large part of it is a high, ice-covered plateau, at an elevation ranging from 7,000 to 10,000 feet. The South Pole itself lies at an altitude of 10,200 feet above the level of the seas. Amundsen, its discoverer, ascertained this fact (see AMUNDSEN, ROALD).

Most of the Antarctic continent, so far as it has been explored, has high coasts, covered with snow and ice, which sometimes extend to the water's edge. In many regions the actual shore line is hidden by masses of ice which rise perpendicularly from the water. The largest of these is the Great Ice Barrier, also known as the Ross Barrier, from the name of its discoverer. The Ross Barrier extends from Ross Island to King Edward VII Land, a distance of 400 miles. This wall of ice, from 200 to 300 feet high, was discovered in 1842, but for years no explorer found a way to cross it. Back of the ice barrier the land rises to a plateau 4,000 feet above the sea. In the interior, especially in South Victoria Land, are high mountain ranges, at least one

of which, Mount Erebus, is an active volcano. Recent explorations point to the possibility that these mountains are a part of a great range or series of ranges which extend to West Antarctica.

Climate. The temperatures in the south polar region seem to be warmer in winter and colder in summer than those in the north polar region. The coldest temperature seems to be about —70°, and the summer temperature occasionally rises to —20°. Sudden blizzards, with terrific winds and blinding snow, are frequent at all seasons. Such a blizzard caused the death of Captain Robert Scott and his three companions after they had succeeded in reaching the Pole. The winds in the interior of the Antarctic continent are mainly southeast, but farther from the Pole the prevailing winds are from the west or northwest. Near the Pole itself the snowfall is comparatively light, the annual precipitation being less than ten inches. The heaviest precipitation, about twenty-five inches, seems to be near the coasts of the Antarctic lands.

Plant and Animal Life. Vegetation is scanty, but there are a number of species of grasses, mosses and lichens. The coal deposits which have been discovered at several points indicate, however, that the South Pole was in a past geologic age in a warm region with abundant vegetation. Among animals there is a great variety of birds, including penguins, petrels and fulmars, but there are no land mammals. The sea teems with an astonishing number of seals, sea-lions, whales, dolphins, sponges, mollusks, echinoderms and many species of fishes. (Each animal named is described in these volumes.)

Antarctic Seas. The name Antarctic Ocean is usually given to the waters surrounding the Antarctic continent, but many modern geographers prefer to consider these waters as the southern ends of three separate bodies, the Atlantic, Pacific and Indian oceans. Between the Antarctic lands and the southern ends of the other continents is an unbroken belt of water, varying in width from 600 miles, off Cape Horn, to 2,400 miles, off Cape Agulhas, the southern extremity of Africa.

There are two great currents in the Antarctic waters. One flows northward, between longitude 120° and 140° W., across the Antarctic Circle. As it approaches South America it divides into two; one part goes northward along the west coast, while the other continues eastward past Cape Horn and returns to the Antarctic near longitude 70° E. The second great current crosses the Antarctic Circle near longitude 90° E., and bending eastward, forms the west Australian current (see CURRENTS, OCEAN). The water in the Antarctic Ocean has an average temperature, taking the year as a whole, of 29.8° at the surface and from 32° to 35° F. on the ocean floor.

Ice Formation. In the main, the ice forms of the Antarctic do not differ from those in north polar regions (see ARCTIC LANDS AND SEAS). The ice sheet covering the great land mass is more extensive and probably thicker than that which covers Greenland. The icebergs are great floating blocks, some of them several acres in extent. Several have been seen having a thickness of a thousand feet or more. See POLAR EXPLORATION. J. R.

ANT-EATER, a South American animal, harmless and solitary, which sleeps during the day and seeks its tiny prey at night. Its long, tapering head, small eyes, and short, round ears, in contrast with its bushy, black tail,

SOUTH AMERICAN ANT-EATER

give it a weird appearance. Its tongue is long, and can be thrust out; it is covered with a sticky saliva which holds fast any ants which it touches—a sort of natural "sticky fly paper." The animal has no teeth.

The ant-eater, from tip to tip, is from four to seven feet long. Its head and tail form much more than half this length. It has powerful, long claws, with which it digs into ant hills. Most of its body is covered with fur.

The name *ant-eater* is sometimes given to the *aard-vark,* and *porcupine ant-eater,* to the Australian *echidna.* Both these animals are described elsewhere in this work. See, also, ARMADILLO.

ANTELOPE, *an′ te lope,* the name given to a very large group of animals that are found in great numbers, especially in Africa and Asia. They belong to the same family as sheep, goats and oxen, but differ greatly from any of

THREE OF THE ANTELOPES
(*a*) Male pronghorn; (*b*) female pronghorn; (*c*) chamois; (*d*) eland.

these animals. Antelopes are the most graceful and fleetest of animals, are shy and timid, quite defenseless against flesh-eating animals and trust only to their speed when attacked. They possess slender, usually cylindrical, horns, which, unlike those of the deer, are not shed annually, but are permanent (see MOLTING).

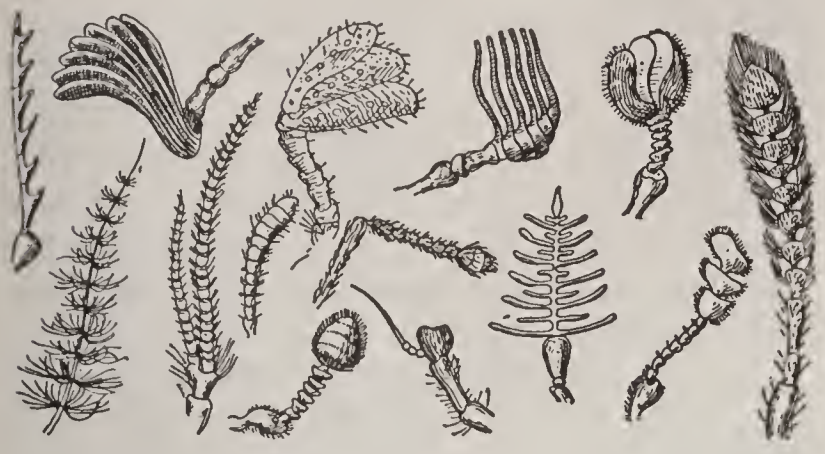
Antelopes differ greatly in their manner of life. Some live on open plains, some in forests and shady nooks. Mountainous regions are the favorite haunts of some species, and others are found only in well-watered valleys. As regards size, they vary from a foot in height to nearly the size of a horse. These animals are not so numerous as formerly, for they are everywhere in danger of being hunted out of existence. In many parts of Africa whole herds numbering many thousands have been destroyed as recklessly as the bison was exterminated in North America. Some of the most beautiful species are found only on private estates.

Most Important Species. The most widely known and characteristic species are the *bushbuck,* also called the *harness antelope,* because of a peculiar white stripe on the body, resembling a harness; the *steinbok,* common in South Africa, a small, alert antelope, reddish in color and having short, ringed horns, curved forward; the *bluebuck,* or *blaaubok,* the most diminutive species, a dainty, timid little creature about as large as a hare; the *koodoo,* or *kudu,* one of the largest, with long, twisted horns and vertical stripes on the sides of its body; the *sable antelope,* of South Africa, remarkable for its shiny black coat; the *oryx,* also a native of Africa, with large, sword-like horns, curving backward; and the *saiga,* one of the few antelopes occurring in Europe, found in Southern Russia.

The true antelope family is not represented in North America, but the pronghorn and the Rocky Mountain white goat are locally called antelopes. The flesh of all antelopes is considered a delicacy, and the hides of the larger animals make good leather. See ADDAX; GAZELLE; GNU; PRONGHORN; CHAMOIS; ROCKY MOUNTAIN WHITE GOAT. In connection with these articles are illustrations of the various types. F.ST.A.

ANTENNAE, *an ten' nee,* the plural of *antenna,* are feelers with which insects and other

animals are provided, and with which they smell, feel, distinguish between friends and enemies, and, in some cases, hear what is going on around them. Some insects are compelled to trust to their antennae instead of the usual power of sight, not being provided with eyes. Others are provided with both eyes and feelers. Insects have only one pair of antennae, while crustaceans, such as lobsters, have two pairs. They consist of long, extremely delicate, jointed appendages projecting from the head, supplied with numerous nerve branches connected with the brain. The shape and size of antennae vary considerably. Those of butterflies and moths are graceful and feathery; in mosquitoes they are long and very thin; covered with minute hairs. Animals and insects are rendered peculiarly helpless by the loss of their antennae as they are deprived of all the senses except, in some cases, that of sight.



ANTENNAE
A few of the different forms, highly magnified.

ANTHOLOGY, *an thol' o ji,* from the Greek for a *flower-gathering,* is a book made up of selections from the best writings of many authors. It was this meaning of the word which suggested to Montaigne the following lines in the preface to a miscellaneous collection of poems:

> I have gathered me a posie of other men's flowers, and nothing but the thought that binds them is mine own.

Though the great historic anthologies have been collections of poems, the term as popularly used includes both prose and poetry.

The word *anthology* was first applied to a collection of Greek poems selected by Meleager, a Syrian, about 80 B.C., but the Chinese *Book of Songs,* supposed to be the work of Confucius, is said to be the oldest anthology known to man. The Arabs, Persians, Turks, Japanese and Hindus have numerous anthologies, some of which are of very early date.

The standard English anthology is F. T. Polgrave's *Golden Treasury.* Other valuable collections are Trench's *Household Book of English Poetry,* Emerson's *Parnassus,* Quiller-Couch's *Oxford Book of Verse* and Stedman's *Victorian Anthology* and *American Anthology.*

AN'THONY, SAINT, OF THEBES (about 251-356), one of the greatest of the early fathers of the Catholic Church, revered as the founder of the first monastery. Born of wealthy parents in Upper Egypt, he early obeyed the divine call to give up a worldly life, and, having given to the poor all that he possessed, retired to the deserts near Thebes. After spending many years in fasting, prayer and meditation he was asked to leave his retreat in order that others might live under his direction, and in the year 305 he founded a monastery at Fayum, near Memphis, the beginning of the monastic system of the Catholic Church. At his death his disciples numbered 15,000. See MONASTICISM.

ANTHONY, SUSAN BROWNELL (1820-1906), an American reformer, one of the great leaders of the cause of woman's advancement, founder of the first state Women's Temperance Society and one of the founders of the National Woman's Suffrage Association. She was born at Adams, Mass., of Quaker parents, taught school for fifteen years, and in the meantime became active in the temperance and anti-slavery movements. In 1868 she founded *The Revolution,* a periodical devoted to women's rights, and in 1869 organized, with Mrs. Elizabeth Cady Stanton, the National Woman's Suffrage Association, of which she was president for many years. Miss Anthony was arrested, tried and fined in 1872 for attempting to vote, under the Fifteenth Amendment, in New York. As a lecturer and advocate she spoke to vast audiences in all parts of England and the United States, and she was a frequent contributor to magazines. See WOMAN SUFFRAGE.

SUSAN B. ANTHONY
Revered pioneer in the now-popular cause of woman suffrage.

ANTHRAX, *an' thraks,* an acute infectious disease to which cattle, horses, sheep and other animals are subject. It is the first disease traced to the action of bacterial generation

and is always associated with the presence of an extremely minute micro-organism in the blood. Anthrax frequently extends over large districts, affecting all classes of animals, both wild and domestic. It is also called *splenic fever*. In man, it appears as a carbuncle, a malignant pustule, or as wool-sorter's disease. Thorough disinfection should follow every case of the disease. If the bodies of animals dying of anthrax are not burned, water and soil are liable to be contaminated, the poison to be carried by birds or flies, and the terrible disease communicated to human beings. Animals may be rendered immune by proper veterinary treatment.

ANTHROPOLOGY, *an thro pol' o ji,* literally, is the science of man, the word being derived from the Greek *anthropos,* meaning *man,* and *logos,* meaning *science.* The term has been given various meanings, as the study of man's past has developed, but it now includes the development of man as a race, his appearance on the earth and his progress toward modern culture; in other words, the distribution of man over the earth and the results of the distribution. The departments of anthropology are archaeology, ethnology and ethnography (which see).

Related Subjects. The following list does not attempt to exhaust the possibilities of anthropology, but it includes all of the peoples separately treated in these volumes, as well as a number of articles on manners and customs in all parts of the world. The sections on *People* in the articles on the various countries should also be read in connection with this study:

PEOPLES

Aborigines
Aino
Aleuts
Angles
Arab
Aryan
Aztec
Bantu
Basque
Bedouins
Berber
Boer
Bushmen
Cannibal
Cave Dwellers
Celts
Cimbri
Circassians
Cliff Dwellers
Copts
Cossacks
Czech
Dyaks
Eskimo
Gael
Goths
Gypsy
Helvetii
Hottentots
Huns
Igorrote
Indians, American
Jews
Jutes
Kaffirs
Kalmucks
Kanakas
Kirghiz
Letts
Lombards
Magyars
Mahrattas
Mandingo
Maoris
Matabele
Maya
Mongols
Moors
Mound Builders
Mulatto
Negritos
Negro Race
Picts
Ruthenians
Sabines
Samnites
Saracens
Saxons
Semites
Slavs
Slovaks
Tartars
Teutonic Races
Tree Dwellers
Turanian
Turks
Vandals
Walloons
Zulus

The various Indian tribes are listed in an index with the article INDIANS.

MANNERS AND CUSTOMS

Ban
Barbecue
Blood-money
Cannibal
Caste
Family
Fetish
Harem
Marriage
Names, Personal
Nomad Life
Polygamy
Salutations
Suttee
Taboo
Tattooing
Vendetta
Zenana

The following general articles will also be found helpful and interesting:

Archaeology
Bronze Age
Ethnography
Ethnology
Folklore
Iron Age
Kitchen Middens
Lake Dwellings
Man
Races of Men
Stone Age

ANTI-CIGARETTE LEAGUE OF AMERICA, an organization with branches in most of the large cities of the United States, Canada and the Panama Canal Zone. Its membership includes more than 500,000 boys and men who have pledged themselves to abstain from liquor and tobacco in every form "and to use their influence to induce others to abstain." The pledge may be made binding for life, or only until the age of twenty-one.

BADGE

This great organization, international in its scope, is the outgrowth of a local league started in Chicago in 1899 by Miss Lucy Page Gaston. Miss Gaston's work among the boys of that city attracted the attention of certain business men who offered her financial assistance if she would undertake similar work on a national scale. The league is supported by membership fees of ten cents each and by voluntary contributions. The league's active members are entitled to wear a button, which is reproduced in the accompanying illustration. Girls and women are invited to join the league as auxiliary members and to throw the weight of their influence against cigarette smoking and other vices.

The league publishes a monthly magazine,

Boy's Companion, and a variety of other literature in furthering its work. It does not confine itself to educational campaigns among boys, but takes an active share in promoting legislation against the sale of tobacco to minors and in influencing public opinion to demand rigid enforcement of such laws. It also has free clinics at which those who cannot rid themselves of the cigarette habit may find aid, without expense. Medical treatment and diets which will help to do away with the craving are recommended by able physicians, and representatives of the league visit schools and churches for the purpose of offering such aid to boys.

The treatment suggested by the league as a cure for the cigarette habit is given in the article CIGARETTE (which see). L.P.G.

ANTICOSTI, *an ti kahs' ti,* a rocky island in the Gulf of Saint Lawrence, one of the largest private game preserves in North America. Geographically it is a part of the Province of Quebec, but in 1895 it was leased by the government to M. Menier, the French manufacturer of chocolate, who made it a game preserve and attempted to develop its resources. The fact that the island was in the possession of a private individual caused much criticism at the beginning of the War of the Nations in 1914, for its position at the mouth of the Saint Lawrence River makes it of great strategic importance. The use of the island as a base for enemies is a remote possibility, however, because of the lack of good harbors. The north shore is high and rocky; the south shore has shoals and submerged rocks.

Anticosti is a favorite resort for seal, bear and other wild game, and the adjacent waters are filled with salmon, trout, cod and herring. The climate is severe, frosts being common even in midsummer. Extensive agriculture is impossible, for the interior for the most part is either swampy or rocky. Even where the soil is otherwise suitable for crops the prevalence of frosts in midsummer limits agricultural development. Marl is found at many points along the coast, and the peat-bogs are the most valuable in the Dominion. The island is of interest to geologists as one of the best examples of the transition between the Ordovician and Silurian systems (see GEOLOGY). Its area is 3,147 square miles, about one and a half times as large as the state of Delaware. There are numerous lighthouses, whose keepers, with their families, comprise most of the population of 250.

ANTIDOTE, *an' ti dote,* a substance which will neutralize the effect of a poison. Thus, an acid is an antidote to an alkali and an alkali to an acid, because chemically each destroys the effect of the other. Morphine and atropine are not chemically opposed to each other, but they are antidotes each for the other, because their action upon the body is opposite. There are many poisons for which no antidote is known, and in cases where these have been taken, the stomach pump and emetics furnish the only method of combating their evil effects. In many cases of poisoning, promptness of relief measures is the most important consideration, and it is often necessary to give some help before a doctor can arrive. A general rule is to empty the stomach at once with a pump except when the poison taken is lye, caustic potash or soda, or mineral acids. The following list gives the names of many of the ordinary poisons, with their antidotes and some means of counteracting their injurious effects. In every case, however, a doctor should assume charge as soon as possible:

Alcohol: Use an emetic or stomach pump as quickly as possible; then give aromatic spirits of ammonia till the pulse is rapid and full; then apply heat to the extremities and cold to the head.

Ammonia: See *Caustic Potash,* below.

Arsenic: Give to the patient every half-hour, for four doses, a tablespoonful of dialyzed iron, a substance which may be obtained at any drug store. Follow this treatment by a strong dose of castor oil.

Bedbug Poison: See *Corrosive Sublimate,* below.

Bichloride of Mercury: See *Corrosive Sublimate,* below.

Carbolic Acid: Give Epsom salts, the chemical name of which is magnesium sulphate, or any other soluble sulphate. At the same time give large doses of sweet oil, whites of eggs and stimulants.

Carbonic Acid Gas, or *Asphyxiation:* Give plenty of fresh air at once. If necessary, induce respiration artificially, as described in the article DROWNING. Give thirty drops of aromatic spirits of ammonia at half-hour intervals for three doses; and then every three hours for three doses give an ounce of diluted whisky.

Carbonic Oxide: See *Carbonic Acid Gas,* above.

Caustic Potash: Give diluted lemon juice,

or mix two parts of vinegar with one of water and give with freedom; then give large amounts of sweet oil.

Chloral: Give the patient an emetic consisting of thirty grains of ipecac in water, and inject under the skin one-twentieth of a grain of strychnine. Apply warmth, induce artificial respiration (see DROWNING) and rub the body thoroughly to stimulate circulation.

Coal Gas: See *Carbonic Acid Gas,* above.

Cocaine: Lay the patient on his back and give whisky, with hypodermic injections of one-fortieth of a grain of strychnine.

Corrosive Sublimate: This is bichloride of mercury. The mercury salt dissolves in an excess of albumin. As soon as you have formed an albuminate try to induce vomiting. For this purpose give an emetic of thirty grains of powdered ipecac in warm water; then give the white of an egg. Wash out the stomach, and later use sedatives.

Knock-out Drops: See *Chloral,* above.

Lye: See *Caustic Potash,* above.

Matches: See *Phosphorus,* below.

Morphine: See *Opium,* below.

Nicotine: Use emetics; give strong tea and stimulants, and then lay the patient flat on his back.

Nux Vomica: See *Strychnine,* below.

Opium: Empty the stomach as quickly as possible, by means of emetics or stomach pump; cause the patient to inhale ammonia, and give him every hour a half-grain of permanganate of potash. Induce artificial respiration (see DROWNING) and keep the patient awake; if necessary, shake him or even whip him severely about the body and the calves of the legs. Atropine injected under the skin, or tincture of belladonna given by the mouth, has a powerful effect in stimulating breathing. Coffee should also be given to a person who has taken opium.

Oxalic Acid: Chalk, whiting or even whitewash scraped from the wall should be given in quantities of water. Follow this by a dose of castor oil or Epsom salts.

Paris Green: See *Arsenic,* above.

Phenacetin: Give whisky and digitalis.

Phosphorus: Give an emetic promptly, and follow with a large quantity of mucilage from gum arabic; then give a strong dose of Epsom salts. Do not give fats or oils.

Poison Ivy: Bathe the affected parts repeatedly with lead acetate dissolved in alcohol. Wash well with laundry soap and water.

Prussic Acid: This is one of the deadliest of poisons, and death usually results at once. If the quantity taken is small enough, however, good many be done by emptying the stomach and administering ammonia with water and a small dose of opium. Artificial respiration (see DROWNING) and the injection of strychnine are also effective.

Rough-on-Rats: See *Arsenic,* above.

Strychnine: Employ the stomach pump at once; give twenty grains of zinc sulphate or thirty grains of powdered ipecac as an emetic; then twenty grains of chloral and thirty grains of bromide of sodium dissolved together in two ounces of hot water should be injected into the rectum. Convulsions may be stopped by the use of chloroform. Twenty grains of sodium bromide should be taken internally every hour.

Sulphonal: Empty the stomach and use artificial respiration (see DROWNING). Give plenty of hot coffee as soon as possible.

Tansy: Give an emetic of thirty grains of ipecac in warm water, and follow with a dose of castor oil.

Turpentine: Give an emetic; then give plenty of mucilage from gum arabic, Epsom salts and finally a hypodermic injection of morphine.

Unknown Poison: Of course there can be no very intelligent treatment when the nature of the poison is unknown (see POISON). If the poison has been introduced by way of the mouth, use the stomach pump or an emetic. Induce artificial respiration if necessary (see DROWNING), and give two teaspoonfuls of chalk in water, four eggs beaten up with a glass of milk and some whisky.

Washing Soda: See *Caustic Potash,* above.

White Precipitate: See *Corrosive Sublimate,* above. W. A. E.

ANTIETAM, *an tee' tam,* BATTLE OF, the bloodiest battle in the War of Secession, and the crucial battle in Lee's first attempt to invade the North. Lee saved his army from what seemed at one time inevitable destruction, but his invasion ended in failure. It was fought near Antietam Creek, in Maryland, about fifty miles northwest of Washington, D. C., on September 16 and 17, 1862. The Confederate forces of 40,000 men, under the command of General Lee, were opposed by a Federal force of nearly double that number under General McClellan.

On the whole the honors rested with Lee, whose generalship was of the highest order, whereas the tactical blunders of McClellan

and his generals were the cause of much subsequent criticism. The fighting on the first day was a preliminary skirmish, but on the

CONFEDERATE MONUMENT

Erected to commemorate Antietam, at Shepardstown.

second day the Federal dead numbered 12,400 and the Confederate dead about 10,000, a greater total than on any other single day of the war. Hooker, Burnside, Sedgwick, Slocum and Meade were the leading Federal generals; Longstreet, "Stonewall" Jackson, Hood, Early, A. P. Hill and D. H. Hill were Lee's chief lieutenants. The retreat of the Confederates on the 18th gave the North the shadow of victory, for which Lincoln had waited before issuing the preliminary Emancipation Proclamation (which see), on September 22.

ANTI-FEDERALISTS, a political party formed in the United States when the adoption of the Constitution was an issue before the people. Those favoring the adoption of the Constitution took the name of *Federalists.* The Anti-Federalists opposed the Constitution in the form in which it was presented for acceptance, because they believed that it called for too strong a central government, one which would deprive the states of freedom of action in many directions (see STATES RIGHTS). After the adoption of the Constitution, they favored a strict construction, or strict interpretation, of that instrument, and declared for strong state governments. Thomas Jefferson was their leader. Later the name of the party was changed to Republican, Democratic-Republican and finally Democratic. See DEMOCRATIC PARTY.

ANTIGONE, *an tig' o ne,* one of the most attractive characters of Greek mythology, the constant devoted attendant of her father Oedipus (which see). When her brother Polynices was put to death she was ordered not to bury his body, and because she disobeyed she was shut up alive in a tomb. Her story is told in the *Antigone* of Sophocles.

ANTIGONISH, *an tig' o nish,* N. S., the county town of Antigonish County, situated on Saint George's Bay, a navigable arm of the Gulf of Saint Lawrence, and on the Intercolonial Railway. It is the seat of a Roman Catholic bishop, of Saint Francis Xavier College, with about 250 students, and of Saint Bernard's convent, and has churches of several other denominations. Industrially the town is important for cheese, wood products and grist mill products, and the neighborhood has a few minerals, including oil shale, iron and a little gold. Antigonish is a favorite resort for sportsmen, who come for the excellent bass, trout and salmon fishing. Population, largely of Highland Scotch descent, in 1911, 1,787; in 1921, 1,746. N.G.M.

ANTILLES, *an til' leez,* another name for the West Indies, or, more usually, for all of the islands except their northernmost portion,

The principal islands of the Antilles are shown in black.

the Bahamas. The *Greater Antilles* are Cuba, Jamaica, Haiti, Porto Rico and the less important neighboring islands like the Isle of

Pines. The *Lesser Antilles* include the necklace of islands from Porto Rico to the South American coast, among them Martinique, Saint Thomas, Trinidad and Barbados. See WEST INDIES, and the colored map, under the heading NORTH AMERICA.

ANTI-MASONS, a short-lived American political party which was of considerable importance about 1830. As its name implies, its fundamental principle was opposition to the order of Free-Masons, but this was merely one of a number of factors which united several discontented elements, notably the anti-Jackson men and the advocates of high tariff and internal improvements. The party sprang up in 1827 and 1828 as the result of the anti-Mason agitation following the disappearance of William Morgon (1776-1826).

Morgan claimed to be a Mason and to be writing a book exposing the secrets of the Order. He said he had been threatened with a dire fate if he finished the book; he suddenly disappeared and never was found. The public immediately accused the Masons of his murder, which was denied and never proved. Public excitement in Batavia, N. Y., where Morgan lived, was tremendous, and quickly spread throughout the state. The Anti-Masonic party cast 33,000 votes in 1828 and 120,000 votes in 1830 in New York State alone. The attempt to organize a national party on this basis was not successful, as William Wirt, the candidate for president in 1832, received only 33,000 votes. Many men later prominent in public life, including Thurlow Weed, Millard Fillmore and William H. Seward first attracted public notice as Anti-Masons.

ANTIMONY, *an' ti mo ni,* a brittle, metallic element, of a silver-white color, which does not rust or tarnish when exposed to the air. Pure antimony is from 6.6 to 6.7 times as heavy as water, and melts at a temperature of 830° to 840° F. When alloyed with other metals it hardens them, and it is therefore used in the manufacture of such materials as Britannia-metal, type metal and pewter. It renders the sound of bells more clear and sonorous; it makes tin whiter as well as harder, and makes the types for printing firmer and smoother. The ancient Egyptians and other people of the east used antimony for painting their eyebrows and eye lashes, and certain brilliant red pigments or colors used in oil painting, in dyeing, and in the manufacture of safety matches and fireworks are still made from it. The salts of antimony are very poisonous, and have an effect similar to that of arsenic. Antimony is used in the preparation of tartar emetic and other medicines.

Antimony is sometimes found in its pure state. For commercial purposes, however, it is derived chiefly from *stibnite,* which is about seventy-two per cent antimony and twenty-eight per cent sulphur. Stibnite is mined in Austria, France, Germany, Italy, China, Japan and other countries. It is also found in the United States, but is not profitable to mine because of the low price of the metal. Most of the antimony used in Canada and the United States is imported, but small quantities are obtained in the smelting of lead-ores, which frequently contain it.

ANTIOCH, *an' ti ock,* a famous city of ancient times, the capital of the Greek kings of Syria, called by the ancients the "Crown of the East." It was situated on the left bank of the River Orontes, twenty miles from the Mediterranean Sea, resting on a beautiful, fertile plain or climbing the rugged vine-clad slopes that stretched southward. Antioch was founded in 300 B.C. by Seleucus Nicator, who ruled over a part of the divided empire of Alexander the Great, and was named in honor of his father, Antiochus. At the height of its glory it rivaled Rome and Alexandria, having a population estimated at 400,000, and was the center of an extensive commerce. Its public buildings were magnificent. Under the Romans the Syrian governors resided there, and it was the Eastern headquarters of Julius Caesar, Augustus, Herod and other rulers.

Antioch became the cradle of Christianity for the Gentiles; there the Christians first received that name (*Acts* XI, 26); Paul set out on his first missionary journeys from this city, and in it were held many Church councils. Its later history was troubled. It was seized by the Persians in 538, by the Saracens in 635 and by the Seljuk Turks in 1084. In 1098 the Crusaders captured it after a memorable siege. Is was almost entirely destroyed by the Egyptians in 1268, and at the present time only the ruins of its walls and aqueducts remain. On the site of the ancient city is the modern town of Antakiyeh, an important American missionary station, with Antioch College, an institution of renown. The town has a population of about 30,000.

ANTIPODES, *an tip' o deez,* the name given people who are on exactly opposite parts of the earth. The name means *feet to feet.* Our

antipodes have their feet pointing toward us and their heads away from us. To find the antipodes of any point, take a globe and see where the axis inserted at that point and extended through the center of the globe will appear on the opposite side.

Antipodes Island, a small island in the South Pacific Ocean, 460 miles south by east of New Zealand. It is so called because it is almost directly opposite London, England.

AN'TIPOPE, a person chosen or claiming to have been chosen Pope, in opposition to the Pope regularly chosen in accordance with canon law. For political reasons, or sometimes for religious reasons, certain factions in the Roman Catholic Church or certain European rulers opposed the authority of the Pope and supported an antipope in opposition. In the days when the Pope had temporal as well as spiritual authority political considerations often played the most important part in the election of the Supreme Pontiff. Otho I, Holy Roman Emperor, displaced two Popes for personal reasons; later emperors used military force to displace Popes or set up antipopes; the kings of France frequently interfered, and even the kings of Sicily, a comparatively unimportant kingdom, sometimes set up antipopes in opposition to the Popes supported by the emperors.

The first antipope was said to be Laurentius, elected in 498 in opposition to Symmachus, and the last was Felix V, a duke of Savoy, who was elected in 1439. The most famous of the antipopes was elected after the death of Gregory XI, in 1378. Gregory was a Frenchman, but he removed the papal see from Avignon back to Rome, where the cardinals proceeded to elect an Italian, Urban VI, as Pope. Shortly afterward the College of Cardinals was induced to elect the antipope Clement VII, a Frenchman, who was recognized as Pope by France and Spain, while Italy, Germany and the whole north of Europe except Scotland supported Urban. This rivalry produced the "great schism," or "great schism of the West," which divided the Church for half a century.

ANTIPYRENE, *an ti py' rin,* a white powder, given often as a medicine to relieve pain or to lower fever temperature. As it makes the heart beats slower and causes the pulsations to be weaker, it should not be taken except upon the advice of a physician, especially if the patient has a tendency to heart disease. Some physicians use it as a substitute for morphine in trying to cure the drug habit, but its value for this purpose is by no means well established.

ANTI-SALOON LEAGUE, an organization for stopping the liquor traffic, first through education of the people regarding the effects of liquor, and then by legislation of a prohibitory character. The anti-saloon league was first organized as a state body in Ohio in 1893, and it is now found in every state in the Union. It includes members of all political parties and all religious denominations. Its method is to unite all organizations and influences that are opposed to the liquor traffic and to use their combined influence to secure laws that will greatly restrict the use of intoxicating liquors or entirely stop their sale. There is a national organization, fully officered, with headquarters at Westerville, Ohio, and Washington, D. C. Each state has a state superintendent and a board of managers, which usually includes representatives from all political parties and religious denominations. Since the passage of the Eighteenth Amendment the League has been watchful for violations of the new national law. See PROHIBITION; TEMPERANCE; LOCAL OPTION. S.E.N.

ANTISEPTIC, *an ti sep' tik,* any agent which prevents or stops the decay of vegetable or animal matter, *septic* being derived from the Greek word for *rotting* or *decay.* Literally, therefore, the term *antiseptic* is general in its meaning, but in popular speech it is so commonly associated with medicine and surgery that it seems best to discuss the subject under two headings—first, in the arts generally; second, in medicine and surgery.

In the Arts. A distinction should be made between a true *germicide,* that is, germ-killer, and an agent which merely prevents the development of germs. Thus, cold storage prevents the growth of bacteria in meat, but it does not destroy all of them, and if meat is removed from cold storage undestroyed germs will develop. On the other hand, extreme heat, whether wet or dry, kills bacteria. Bacteria grow only under certain favorable conditions of moisture, temperature and food supply; if these are removed they cannot develop. Canned meats, fruits and vegetables, for example, are first cooked and then sealed while hot in air-tight vessels to prevent them from "spoiling"; this is merely an application of antiseptic principles.

Occasionally such active antiseptics as boric acid and formaldehyde are mixed with foods.

but as these are harmful their use is generally prohibited (see PURE FOOD LAWS). The packing of fish in ice and the curing of cod and herring with salt are familiar antiseptic processes. Alcohol is an excellent antiseptic, especially for household use. It is a good gargle, is useful for external applications, and either in its pure or diluted forms is frequently used in cooking and preserving foods. Wood may be preserved by treatment with creosote or tar, and many other substances may be saved from decay by antiseptics.

In Medicine. The use of antiseptics in medicine is related to the germ theory of disease. According to this theory, many diseases are caused by foreign organisms, called *bacteria.* To kill these bacteria or prevent their growth is the function of antiseptics. The term *disinfectant,* while popularly used in various senses, should be applied only to a special agent used to destroy a definite infection.

The most important antiseptics now in use are iodine, carbolic acid, peroxide of hydrogen, iodoform, formalin, salicylic acid, bichloride of mercury, arsenic, hypochlorite and various preparations of coal-tar, including lysol. Nearly all of these substances, if taken internally, are extremely poisonous, and if applied externally in too strong solution or too large quantities may cause more harm than good. For these reasons they should be kept in bottles or boxes labeled *poison,* and should be placed where children cannot reach them.

Pure carbolic acid is sometimes applied to infected living flesh; it completely destroys foreign organisms and even burns away part of the flesh. Surgeons use a solution of one part carbolic acid to twenty parts of water to sterilize their instruments. Bichloride of mercury is usually the last antiseptic applied to the hands of a surgeon before he begins an operation; so powerful is it that a solution of 1 to 2,000 is sufficiently strong to kill any germ. Surgical instruments are also disinfected by boiling in water or exposure to steam. Iodine is most frequently used as an antiseptic on the patient. For ordinary cuts or wounds, such as those caused by a rusty nail or knife, tincture of iodine is a good remedy. The secret of preventing infection is prompt action.

The use of antiseptics was introduced in the last quarter of the nineteenth century, chiefly through the efforts of Sir Joseph Lister, Robert Koch and Louis Pasteur (see the records of these men in articles bearing their names). Their work, however, has led to the so-called *aseptic* method of surgery, which aims to prevent transmission of germs to a patient rather than to kill them after they have developed. The reason for this process is that every antiseptic causes some irritation, slight or serious, of the normal tissues of the body, besides destroying the infection. Modern aseptic surgery, therefore, attempts to eliminate infection. See SURGERY; also BACTERIA AND BACTERIOLOGY; DISEASE, subhead *Germ Theory of Disease;* PUTREFACTION. W.A.E.

ANTITOXIN, *an ti tok' sin,* meaning, literally, *against poison,* is a substance formed in the blood which possesses the power of neutralizing or destroying some particular toxin, or poison. Usually antitoxins are developed by the body as a result of the presence of poisonous disease bacteria in the blood, and they are the result of the body's effort to fight off disease. The injection of antitoxin into a healthy person as a protection against a disease sometimes renders him temporarily immune from it. For use in medicine antitoxins are usually developed in animals and then injected into human beings. In this case they give the body an extra stimulus in its combat with disease. They have proved of great service in the treatment of diphtheria and lockjaw. See BACTERIA AND BACTERIOLOGY; SERUM THERAPY; VACCINATION. W.A.E.

ANTI-TRUST LAWS, the name popularly given to those laws passed for the purpose of regulating or suppressing trusts. The tremendous power of some modern monopolies, with the frequent abuses of this power, aroused public opinion to demand that some curb be placed on them. Practically every civilized nation now restricts the powers of trusts. For further details, see TRUST, subhead *Trust Regulation.*

ANT-LION, the name given to the larvae (young) of an insect which in its perfect state resembles a large, four-winged fly like a dragon fly. It is remarkable on account of the ingenious method by which it catches ants and other insects on which it feeds. The ant-lion has a large head, somewhat flattened, its hind-body is broad and oval, and its whole body is covered with short, stiff bristles. The mouth is always closed and is provided with strong nippers, the tips of which are perforated. Down the center of each of the jaws runs a groove or a tube along which the juices of the victim pass into the mouth. Ants or the other insects caught are impaled by the sharp points

of these jaws and their juices sucked through the tubes.

ANTONY, *an' to ni,* MARK, in Latin, MARCUS ANTONIUS (83-30 B.C.), a great Roman orator, soldier and statesman, the friend and lieutenant of Julius Caesar, and himself the ruler of half the Roman world after Caesar's death. Yet this man, before whom the noble "conscript fathers" of the Roman Senate trembled, to whom millions of people looked as their lord and master, could not command himself. He gave free reign to his baser impulses, was untrue in turn to each of his four wives, and finally lost power and honor as the result of his infatuation for Egypt's queen, Cleopatra. He was probably the greatest of his day in everything he undertook, soldier, statesman, ruler, debauchee—he ran the gamut of the vices and virtues.

MARK ANTONY
From a bust now in the Vatican, Rome.

Rise to Power. Mark Antony belonged to an ancient and powerful patrician family, and before he was thirty he had been raised to an important position under Caesar, who was then in Gaul. After several years in Gaul he returned to Rome and was elected tribune of the people; when civil war broke out he was expelled from the city as an adherent of Caesar. At the battle of Pharsalia, by which Caesar became master of Italy, Antony was second in command, and on several later occasions he was left in supreme control at home while Caesar was in Gaul. In 44 B.C. he was consul with Caesar, and on Caesar's death was easily the foremost man in Rome. He sought to make himself a ruler as great as Caesar, and led his soldiers, many of them veterans of Caesar's campaigns, against Brutus. While Antony was absent from Rome, young Octavius, later called Augustus Caesar, secured the support of the Senate, and leading new forces to aid Brutus, drove Antony across the Alps.

The Triumvirate. Octavius, however, angered by the Senate's action in giving Brutus supreme command, made terms with Antony, and with Antony and Lepidus, a wealthy patrician, agreed to divide among the three the Roman world. Antony was to receive Gaul; Lepidus, Spain; and Octavius, Sicily, Sardinia and Africa. In the next year, 42 B.C., the triumvirate established its power in Italy by a victory at Philippi.

Antony went to Greece, and then to Asia Minor, to complete the dominion of the triumvirate and arrange for payment of tribute. At Tarsus there came to do him homage Cleopatra, queen of Egypt, whose charms completely conquered him. He followed her to Egypt, where he spent the winter in luxury, flattery and self-admiration. He was roused from his dream by hostilities between his own brother and Octavius, and hurried to Rome only to find Octavius victorious. The great leaders again became reconciled; Antony married Octavia, the sister of Octavius, and a new division of the world was arranged. Lepidus was disregarded, Antony taking the East, and Octavius the West.

Antony then spent several years in the East, without adding in any way to his fame. The call of Egypt then became irresistible, and he returned to Cleopatra, on whom he lavished kingdoms and provinces, to the disgust of Octavius and the Senate. Finally, in 32 B.C. the Senate declared war against Cleopatra, and after two years of preparation its forces were victorious in the battle of Actium. The queen fled to Egypt, followed by Antony, and soon the two were pursued by Octavius. When the false rumor came to him that Cleopatra was dead, Antony threw himself on his sword.

The story of Antony has been told by Shakespeare in *Julius Caesar* and in *Antony and Cleopatra,* many lines of which are often quoted, especially the beginning of Antony's masterly oration to the people at the funeral of Caesar:

"Friends, Romans, countrymen, lend me your ears;
I come to bury Caesar, not to praise him."

ANTWERP, *ant' werp,* in French, ANVERS, is the principal maritime city of Belgium and one of the greatest ports in the world, situated on the right bank of the river Scheldt, about fifty miles from its mouth. During the twenty-five years preceding 1914, when the War of the Nations began, its trade increased at a faster rate than that of any European port. Its growth and development dates from 1863, when the tolls levied by the Netherlands on the

shipping going up the Scheldt were abolished (it must be remembered that the estuary of the river is part of the territory of Holland). Population, 1920, 333,882; including suburbs, about 400,000.

Chief Buildings. Among the buildings that have been preserved from the period of its greatness the most important is the cathedral. The Antwerp cathedral is the largest, and many people consider it the most beautiful, Gothic church in Belgium. Its graceful and lofty tower, over 400 feet high, is seen for a long distance as a conspicuous landmark in the flat, surrounding plain. The cathedral has only one tower, for a second tower which formed part of the original plan has never been completed. It is famous for its artistic treasures, among which are the three celebrated masterpieces of Rubens—the *Descent from the Cross,* the *Elevation of the Cross* and the *Assumption.* These great masterpieces were removed from the city for safety when the German "drive" through Belgium began in August, 1914.

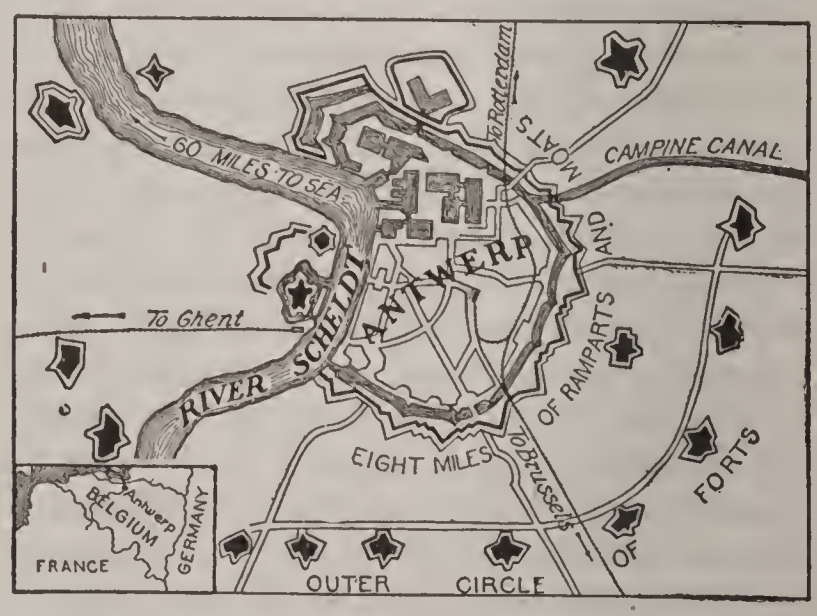
The most important secular building is the town hall, built in the sixteenth century in the Renaissance style; it is rich in carved wood panel-work, mural decorations and other works of art. Antwerp has a picture gallery which contains a fine collection of paintings of the Flemish school, the most famous being the priceless collection of paintings by Rubens and Van Dyck. One of the most interesting museums in the whole world is the Museum Plantin-Moretus. It was the house and workshop of the great printer Plantin and contains a collection of everything pertaining to printing in its early stage. The library contains a collection of the artistic works issued from this great printing establishment, including the famous *Biblia Polyglotta,* published from 1568 to 1573. Among its numerous educational establishments Antwerp contains a good school of arts and a well-known conservatory of music.

Commerce and Industry. The harbor is spacious and is one of the finest in the world. The Belgian government did not spare any expense in order to improve and equip it with all the most modern facilities for accommodating the largest steamers. When the war broke out in 1914 work was nearly finished on a vast program of improvements which had cost $50,000,000. Before 1914 nearly 17,000,000 tons of shipping entered and left Antwerp yearly. Besides its vast trade Antwerp has numerous and varied industries, among which are sugar refining, diamond cutting, lace making, brewing, distilling and shipbuilding.

History. Antwerp began to attain a prominent position during the fifteenth century, when it became the chief port of the Hanseatic League (which see) and the great port of entrance for trade between the various parts of the Continent and England. It was at that time the chief money market in the world. It reached the height of its prosperity in 1560, when frequently as many as 500 ships entered the port in one day. Soon afterwards the struggle of The Netherlands to gain their religious and political freedom from Spain, in which Antwerp took a prominent part, ruined its trade.

Antwerp declined continuously until 1800, when its population was below 40,000. Napoleon, realizing both the strategical and commercial value of its situation, decided to open and improve its harbor and to set it up as a rival to London. He considered that Antwerp in the hands of a powerful enemy would be "a revolver held at the breast of England." The trade of Antwerp began to grow very rapidly, but this lasted only until 1830; then Belgium became separated from Holland, and the latter country imposed heavy tolls upon the shipping of the Scheldt. These tolls were finally abolished in 1863.

Captured by the Germans in 1914. Antwerp was the pivot of the national defense of Belgium, and was one of the strongest fortresses in Europe. It was encircled by a great number of detached forts and other works, skilfully



THE DEFENSES OF ANTWERP

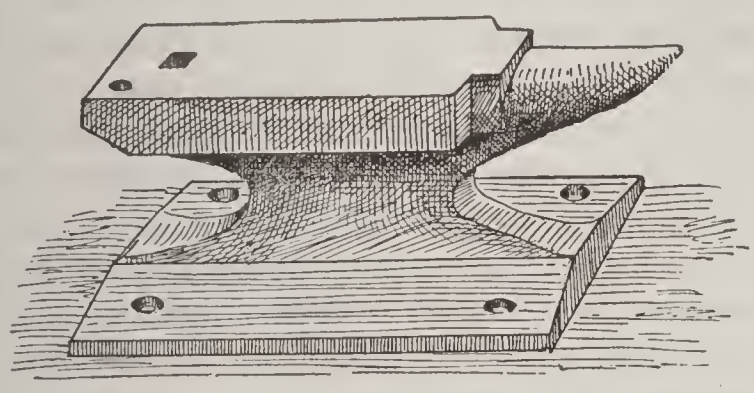
It was thought the fortifications could protect the city against any enemy, for any length of time.

constructed, which transformed it into a great fortified camp. The city was considered almost impregnable, and in any case able to resist a long siege. This was before the War of the

Nations, which changed all former ideas as to the value of fortifications. The development of modern artillery enabled the Germans to capture Antwerp after a short ten-days' contest. The large forty-two centimeter German siege guns simply pounded the forts to bits. The Germans began their attack on the forts on September 28, 1914. It was not necessary for them to surround and besiege the city. The destruction of the forts by artillery compelled the Belgian army, which was reinforced by a number of hastily-gathered and ill-equipped British marines and naval reservists, to abandon the place on the night of October 8. The following day the Germans entered the town. O.B.

ANUBIS, an early Egyptian diety, who was assistant to Osiris (which see) at the final judgment, at which time his duty was to weigh in the scale of justice the heart of the deceased, balancing it against the feather, the symbol of truth and right. The fate of the dead was determined as the scale tipped in either direction.

AN'VIL, a block upon which pieces of metal are laid to be hammered into different shapes. The smallest anvils are those of the gold and silver smiths; they are simple blocks of steel or marble. Anvils for machine-driven hammers are set on anvil-blocks often weighing several tons. The anvil that we all know, however, is that on which the blacksmith shapes the glowing iron into horseshoes, bolts or rings. It is ordinarily of cast or wrought iron with a coat of hard steel, and weighs from 100 to 500 pounds. The rounded projection at one end is called the beak. The two holes shown at the other end in the illustration are to hold the blacksmith's tools.

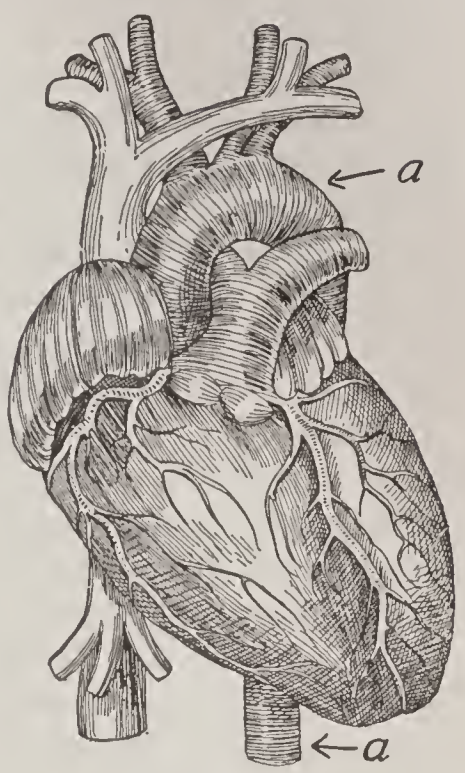


ANVIL

Longfellow's poem, *The Village Blacksmith,* has at its close the famous lines:

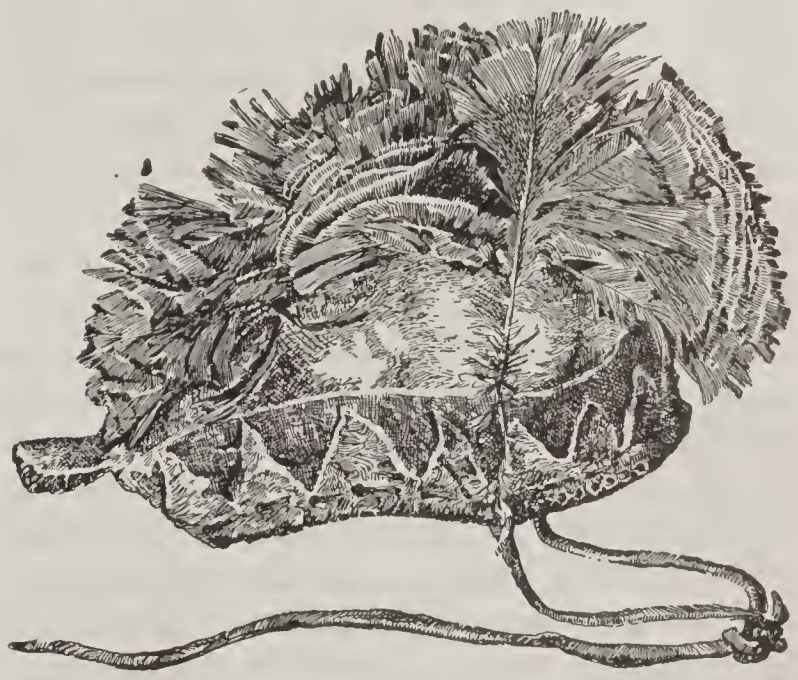
> Thus at the flaming forge of life
> Our fortunes must be wrought;
> Thus on its sounding anvil shaped
> Each burning deed and thought!

AORTA, *a or' ta,* the great artery which carries the purified blood from the heart, and through its branches distributes it to the body. It rises from the left ventricle of the heart toward the top of the breast-bone and there makes a curve, called the *arch of the aorta,* whence it gives off branches to the head and arms. Then going downward through the chest, it gives off branches to the trunk, and passing through the diaphragm finally divides into two branches which supply the pelvis and the lower limbs. See HEART, in connection with which the aorta is illustrated; also ARTERIES; CIRCULATION.



(*aa*) AORTA

APACHE, *a pah' chay,* but commonly pronounced *a patch' ee,* the Zuni Indian word for *enemy,* is applied by the Zuni especially to the Navaho (who are closely related to the Apache), with whom they were almost continuously at war. The Spaniards adopted the name to designate a number of warlike Indians of Northern Mexico and the territory now included in New Mexico and Arizona. The true Apaches belong to the great Athapascan family. They were among the most powerful tribes of the Southwest, and were con-



AN APACHE WAR-BONNET

Worn by the "braves" on their exploits as late as 1866.

scantly raiding the white settlements as well as the weaker Indian tribes on both sides of the Mexican borders.

Their feelings towards the United States were not unfriendly until after the Mexican War, when several unprovoked attacks on them led to a change of attitude. There was hostility of varying degrees until 1860, when warriors of a number of the Apache tribes went on the warpath. Except in the neighborhood of Tucson, they practically drove the white men out of Arizona in the next five or six years. In 1886 several bands of Apaches, principally of the Chiricahua tribe, went on the warpath for the last time. After causing much loss of life and property they were captured, and their leader, Geronimo (Spanish for *Jerome*), and many others were imprisoned. Most of the Apaches now live on reservations in Arizona and New Mexico, but a band of about 270 Chiricahua are in Oklahoma. They make excellent baskets, and on the whole have taken kindly to the white man's civilization. Their total number is about 5,000. See INDIANS, AMERICAN.

The Paris Apaches. The Apache Indians were a brave, warlike people, but judged by civilized standards they were often merciless robbers and murderers. To be taken prisoner by the Apaches meant torture and almost certain death, and in the books written by white men the Apache was a *bad* Indian. For some reason this name was transferred to the underworld of Paris, where the thieves and cutthroats, in loosely-organized bands, are proud to be *Apaches*. E.S.C.

APALACHICOLA, *ap a latch i ko' la,* or **APPALACHICOLA,** a river formed by the union of the Chattahoochee and Flint rivers at the southwest border of Georgia. It flows through Florida in a southerly direction for ninety miles, and enters the Gulf of Mexico through Apalachicola Bay. It is navigable throughout its course for large steamboats and is important in the transportation of the products of the neighboring region, chiefly fruit and cotton, to the sea for distribution to the markets of the world. The town of Apalachicola is situated on the Gulf of Mexico at the mouth of this river.

APE, the animal that is most like a man. The gorilla, the orang-utan, the chimpanzee, and most of the monkeys are properly termed apes, but not the lemur, the loris, the aye-aye or others which bear more resemblance to the lower orders of mammals than to man.

The principal differences in make-up between apes and men are matters of proportion. Both

THE APE

have practically the same organs, muscles and nerves, but the ape has longer arms, shorter legs, a square jaw and a thicker skull, a thumbed foot which can do the work of a hand and a spinal column which does not curve at the base and sometimes is prolonged into a tail. The ape's brain is much smaller than man's though many of the gorillas and orang-utans are larger and more powerful than man. Except for the face, the palms of the hands and the soles of the feet, an ape's body is covered with coarse black or brown hair. Its diet consists largely of fruits, and its home is built on a rude platform constructed in the trees of the tropical forests. All species of apes and monkeys are so imitative that the expression *to ape,* meaning *to imitate,* has become quite common. See CHIMPANZEE; GORILLA; ORANG-UTAN; GIBBON; BABOON; MONKEY.

APELLES, *a pel' leez,* the most famous Greek painter of ancient times. He was born in the fourth century B.C., probably at Colophon in Asia Minor. He became the close friend of Alexander the Great, and his portrait of the latter, with the thunderbolt in his hand, is celebrated. Apelles used to place himself behind a picture in the public exhibitions, in order to hear the criticisms of the common people. His pictures were simple and natural, and his coloring delicate and beautiful. Lucian, a Greek writer of the second century A.D., wrote a description of the paintings of Apelles that inspired many later artists.

APENNINES, *ap′ e nynz,* the mountain range that forms the "backbone" of Italy. It extends from the head of the Gulf of Genoa to the toe of the "boot" and covers about two-thirds of the area of the peninsula. The central division extends to the coast of the Adriatic Sea, but on the west the mountains are separated from the Mediterranean Sea by the Apennine Forelands.

The Apennines are divided into three divisions, the Northern, the Central and the Southern Apennines; each division includes a number of smaller mountain ranges. The sides of the mountains are covered with vegetation, but their summits are bare. They are low mountains, having an average altitude of 4,000 feet. The highest peak, the Gran Sosso, is 9,583 feet; the most noted is Vesuvius (which see). The Apennines contribute much to the scenery of Italy, and furnish her with beautiful marble for which the country has been noted from most ancient times. The Arno and the Tiber are celebrated rivers rising within these mountains.

APHASIA, *a fa′ zhi a,* a Greek word meaning *speechlessness,* is used in English to describe a curious result of certain nervous disorders. The patient loses the power of expressing ideas by means of words, or loses the appropriate use of words, though the vocal organs may be in perfect condition and the mind clear. There is sometimes a total loss of words and sometimes the loss of a few only. In one form of the disease, called *aphemia,* the patient can think and write, but cannot speak; in another, called *agraphia,* he can think and speak, but cannot express his ideas in writing nor understand anything which he sees written. In a great majority of cases, where examinations after death have been made, changes have been found in the brain areas which preside over speech. W. A. E.

APHIDES, *af′ i deez,* very small greenish or brown bugs, commonly known as *plant lice,* that live on the tender shoots of plants, sucking the sap through long, sharp beaks. Most of these insects discharge from the alimentary canal a sweet liquid, the "honey dew" so much liked by ants and other insects (see Ant). Aphides do great harm to growing crops, garden vegetables and hothouse plants, but they are themselves the prey of birds, ants, spiders and ladybird beetles.

APHRODITE, *af ro di′ te,* the Greek goddess of love and beauty. She is far better known by her Roman name of Venus (which see).

APIA, *a pe′ ah,* the principal town of the Samoan Islands. It lies on the north side of the island of Upolu, and its fine harbor has made it the commercial center of the islands of the South Pacific Ocean. The town consists practically of a single street running along the harbor, which is the best in the islands. On the division of the islands between Germany and the United States in 1900, Apia became the capital of German Samoa, but in 1914 it was captured by Australian troops and became a British possession. Near Apia is Vailima, once the home of Robert Louis Stevenson, and on the summit of Mount Vaea, which overlooks the town, Stevenson lies buried. Population in 1920, about 1,600; of American Samoa, 8,056.

A′PIS, a sacred bull that was worshipped by the ancient Egyptians, and kept in the temple of Osiris at Memphis. The bull selected possessed certain very special and distinguishing features, such as a black hide with certain marks on the forehead and back and other distinguishing marks. The birthday of the bull Apis was celebrated every year by the people. When he died he was embalmed and buried in a splendid sarcophagus in a special part of the temple and his death was followed by a period of public mourning.

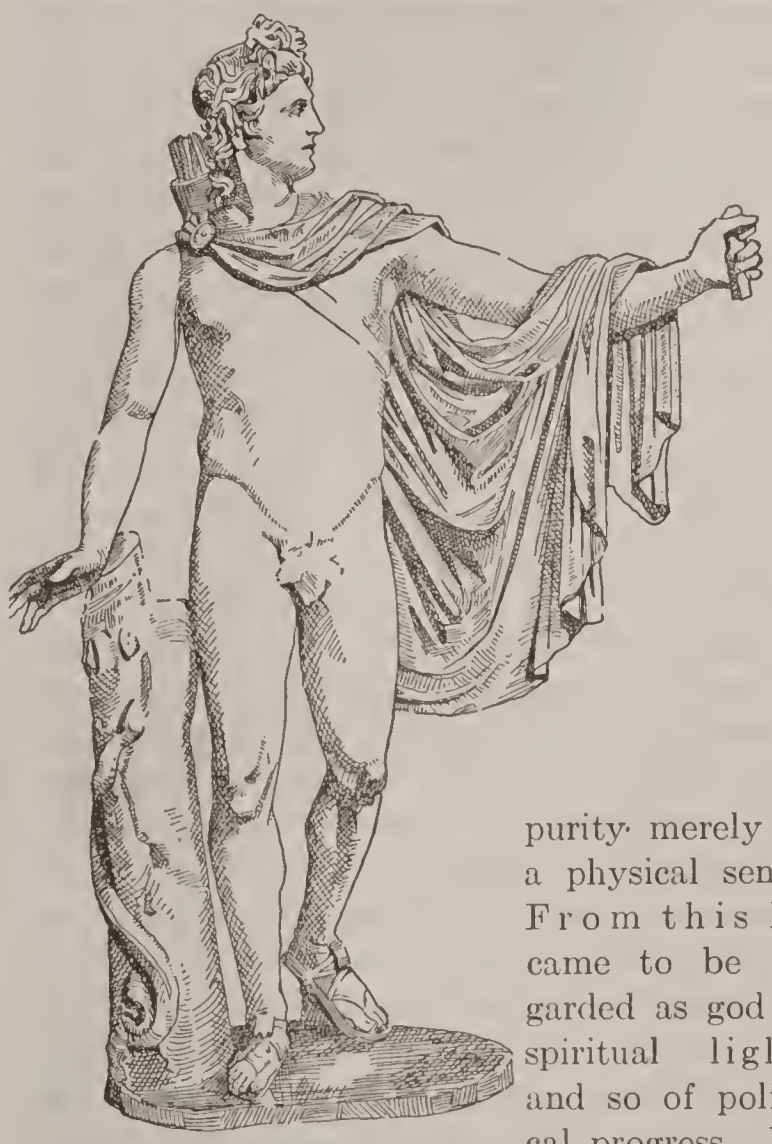
APOCALYPSE, *a pahk′ a lips.* The last book of the New Testament, the work of the Apostle John, opens with these words: "The revelation of Jesus Christ, which God gave unto him, to show unto His servants things which must shortly come to pass." In the Greek language the word for *revelation* is *apocalypse,* from a verb meaning *to uncover,* and thus the book of prophecies came to be known, from its first word, as the *Apocalypse of John.* This name, while still retained in works on theology, is changed in the English version of the Bible to the *Revelation of Saint John the Divine.* For its contents and interpretation, see Revelation.

APOCRYPHA, *a pok′ ri fah,* a term applied to various sacred books which were written between the writing of the books of the Old Testament and the beginning of the Christian dispensation. The term means *hidden* or *concealed.* The books of the Apocrypha are not accepted as authorized books of the Bible by the Protestant churches, but they are accepted by the Roman Catholic Church. The term is specially applied to the following books, written during the two centuries preceding the birth of Christ: The first and second books of Esdras, Tobit, Judith, the latter part of the

book of Esther, the Wisdom of Solomon, the Wisdom of Jesus the son of Sirach, or Ecclesiasticus, Baruch the Prophet, the Song of the Three Children, Susanna and the Elders, Bel and the Dragon, the Prayer of Manasses and the first and second books of Maccabees. See BIBLE.

APOGEE, *ap′ o jee.* See APSIDES.

APOLLO, *a pol′ o,* among the Greeks, the radiant god of light, driver of the chariot of the sun. He was the son of Jupiter and Leto, and the twin brother of Diana, the moon-goddess, and at first was the god of light and purity merely in a physical sense. From this he came to be regarded as god of spiritual light, and so of political progress. He also presided over song and prophecy, inspiring whom he would with musical ability or with the true prophetic fervor.



APOLLO BELVEDERE
From statue in the Vatican, Rome.

In general, he was a kindly deity, smiling upon all, but stories are told of him which show that he had a sterner side. Thus when he was but five days old he killed the dreadful serpent Python (which see), and afterward, with Diana, put to death the children of the boasting Niobe (see NIOBE). The Cyclops, also, felt his vengeful spirit because they had forged the thunderbolts with which Jupiter killed Aesculapius, Apollo's son. Among the ancient statues of Apollo, the most remarkable one is the *Apollo Belvedere,* in the Belvedere Gallery in the Vatican.

In modern times the name *Apollo* is used as the symbol of manly strength and good looks, and the phrase "handsome as an Apollo" is a very common figure of speech.

APOPLEXY, *ap′ o plex i,* the name rather loosely applied to various brain diseases which have symptoms much alike but are due to different causes. The word means literally a *stroke,* and it is under this name that apoplexy is frequently spoken of. In complete apoplexy the person falls suddenly, is unable to move his limbs or to speak, and gives no evidence of seeing, hearing or feeling. His breathing is noisy, much like that of a person in deep sleep, and his face is congested and purple. Apoplexy is most frequent between the ages of fifty and seventy, and stout people with short necks and full chests are generally considered to be more liable to it than thinner persons. The immediate cause is either the bursting of a blood-vessel in the brain, or the presence in such a vessel of some small foreign substance, which brings on congestion.

Disease of the blood-vessel wall, such as causes rupture and, secondarily, apoplexy, is caused by syphilis, tobacco, alcohol, indulgence in too much meat or too much salt, heavy eating, lack of exercise, etc. The immediate causes of the rupture are high blood pressure, over-exertion, straining, outbursts of passion, vomiting and the like. Attacks of apoplexy are often followed by complete or partial paralysis of one side of the body. The paralyzed limbs of a victim of apoplexy should be exercised and massaged every day, and if there is any tendency to contracture the drawing limb must be pulled straight and be put in splints. Exercise and massage of splinted limbs must be persisted in. A third attack of apoplexy is usually fatal. W.A.E.

APOSTLES, *a pos′ els,* the twelve disciples chosen by Christ to preach His doctrine to the world. The story of their selection is given in the Gospels, the best account being found in *Matthew.* They were Simon Peter, and Andrew, his brother; James, and John, his brother, sons of Zebedee; Philip; Bartholomew; Thomas; Matthew; James, the son of Alpheus, and Lebeus, his brother, called Judas; Simon, the Canaanite, and Judas Iscariot. Excepting Matthew, who was a publican tax collector, all were laboring men of the most humble class. After the betrayal, Matthias was chosen by lot in place of Judas Iscariot. The Bible also gives the name of apostle to Paul and to Barnabas.

The term apostles is applied generally to the first Christian missionaries in all parts of the world, and to leaders in any great moral reform; as Saint Boniface, the apostle of Germany; Saint Augustine, the apostle of England; John Eliot, the apostle to the Indians; John B. Gough, an apostle of temperance.

APOSTLES' CREED, a statement of Christian faith which has been traced back to about A.D. 150, so named because it is supposed to have originated with the apostles themselves (see APOSTLES). It is as follows:

"I believe in God the Father Almighty and in Christ Jesus His Son, who was born of Mary the Virgin, was crucified under Pontius Pilate and buried; on the third day rose from the dead, ascended into Heaven, sitteth on the right hand of the Father, from whence He cometh to judge the quick and the dead; and in the Holy Ghost, and resurrection of the body."

The above is not exactly the form used by the churches of the present day; the original Creed has been modified, as follows:

"I believe in God the Father Almighty, Maker of heaven and earth; and in Jesus Christ His only Son, our Lord; who was conceived by the Holy Ghost, born of the Virgin Mary; suffered under Pontius Pilate, was crucified, dead, and buried; He descended into Hell; the third day He rose again from the dead; He ascended into heaven, and sitteth on the right hand of God the Father Almighty; from thence He shall come to judge the quick and the dead.

"I believe in the Holy Ghost; the holy Catholic Church, the Communion of Saints; the forgiveness of sins; the resurrection of the body; and the life everlasting. Amen."

APOTHECARIES', WEIGHT, *a poth' e ka riz,* the system of weights used by druggists when preparing prescriptions. The pound is divided into 12 ounces, the ounce into 8 drams, the dram into 3 scruples and the scruple into 20 grains. In both apothecaries' and troy weight there are 5,760 grains to the pound, 480 grains to the ounce. The avoirdupois pound contains 7,000 grains; the ounce, 437½ grains. The grain, the smallest unit, is the same in all three weights above named, the difference in the size of the pound being due only to a difference in the number of grains it contains.

APPALACHIAN MOUNTAINS, *ap a latch' i an,* or *ap a la' chi an,* the great mountain system occupying the eastern part of North America and extending from the Gulf of Saint Lawrence into Alabama, a distance of over 1,300 miles. The Appalachians form the eastern highlands of the continent, and include a number of parallel ranges, all extending in a southwesterly direction. They form the watershed separating the rivers that flow into the Atlantic from those flowing into the Gulf of Mexico (see WATERSHED).

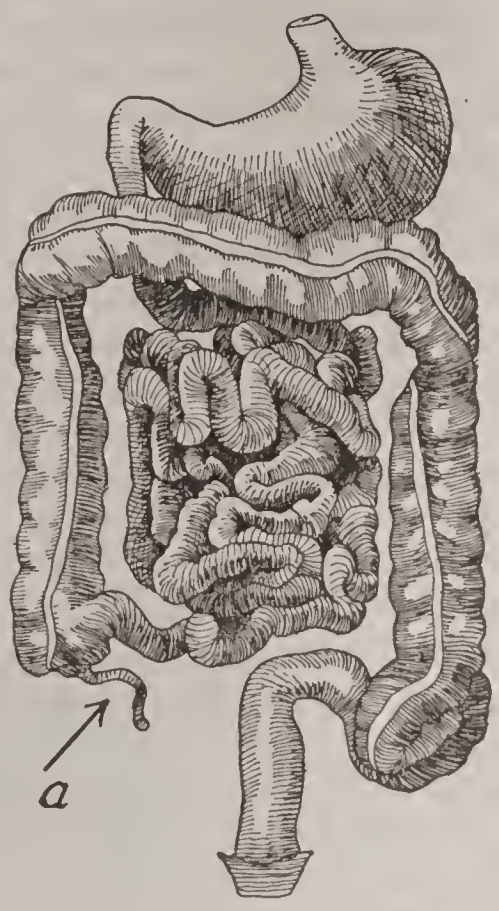
Description. In general the Appalachians are low mountains with rounded summits and even crests, or ridges. With few exceptions their sides are clothed with forests. Between the ranges are many highly-fertile and densely-populated valleys, and the foothills and uplands support a large agricultural population. These mountains are noted for a number of deep, narrow valleys with almost perpendicular sides, through which rivers wend their way to the sea; the most noted of these valleys are *Crawford Notch* in the White Mountains, the *Highlands* of the Hudson and *Delaware Water Gap.* They add much to the scenery of their regions. The highest peaks are Mount Washington in New Hampshire (6,293 feet) and Mount Mitchell in North Carolina (6,688 feet). Lake Champlain is the only lake of importance in the system.

Minerals and Water Power. These mountains contain an abundance of iron ore, coal, fire-clay, marble, gypsum and salt, and extensive oil fields occur in many of the valleys. Many rapid streams flow down their eastern slopes, and where the foothills descend to the low coastal plain there are hundreds of excellent sites for water-power. Along this line we find many manufacturing cities (see FALL LINE). The forests are a valuable source of lumber. For the products of the Appalachian system, see the articles describing the regions through which they pass. See, also, ADIRONDACK MOUNTAINS; BLUE RIDGE; CUMBERLAND MOUNTAINS.

APPEAL, *ap peel',* in law, the removal of a suit from a lower to a higher court for the purpose of securing a reversal or modification of the decision of the lower court. Each system of courts has particular rules upon which appeals may be granted, usually requiring the presentation of additional material evidence, or the certification of an error in the conduct of the trial by the court. An *appeal* allows the higher court to reconsider the facts of the case, to reverse the decision, or in some cases to remand it to the lower court for a new trial, whereas a *writ of error* merely allows it to rule on points of law. See PROCEDURE.

APPENDICITIS, *a pen di sy' tis,* an infection of the vermiform appendix, is one of the commonest diseases to which mankind is subject. It has been estimated that one-third of all human beings who reach adult age have had

appendicitis in some form. Until almost the end of the nineteenth century thousands of people died every year from "inflammation of the bowels" and various other diseases which are now recognized as forms of appendicitis.



LOCATION OF VERMIFORM APPENDIX

Arrow at *a* points to appendix. It is at the right of the exit from the small intestine and at the base of large ascending colon (see INTESTINES).

The appendix is a small, tube-like organ which projects from the *caecum* (blind pouch or sack) of the large intestine. The *vermiform,* or worm-like, appearance of the appendix has given it the qualifying part of its name. It is usually three to four inches long, and from one-quarter to one-half an inch thick. It is normally located on the right side of the abdomen, midway between the crest of the ileum and the navel, but as the closed end is free its position frequently varies. The organ seems useless in man, though in some of the lower animals it is more highly developed and apparently aids the process of digestion.

It was once thought that grape seeds, cherry stones and other foreign substances lodged in the appendix were the chief causes of inflammation. Such cases are now believed to be rare, but wounds, strains, bruises and the accumulation and hardening of undigested food are common causes. It is probable that in a majority of cases the prime factors are bacteria acting upon an injured or weakened mucous membrane, and a condition of lowered vitality of the organism.

Among the symptoms of appendicitis are sharp, colic-like pains, varied by dull aches, which gradually localize themselves in the region of the appendix. Fever usually follows, and is sometimes accompanied by nausea and vomiting. Neither fever nor vomiting, however, are sure indications, but tenderness and stiffness in the region of the appendix are almost certain indications. The diagnosis of appendicitis is so complicated that a physician should always be called whenever this disease seems to make its appearance.

A large proportion of all cases recover, but in severe cases the tissue of the appendix ulcerates and becomes perforated, causing peritonitis, or inflammation of the whole abdominal cavity. In cases of perforation death is almost certain to follow unless prompt surgical measures are taken. In fact, the surgical operation has come to be considered the only certain cure for the disease, and so well known are the method of operation and the subsequent treatment of the wound that the operation is not now regarded as difficult or dangerous. W.A.E.

APPERCEPTION, *ap er sep' shun.* When we see a new object, when we hear a new fact, when we read a new idea—in fact, when we meet with any new kind of experience—the mind refers it to the store of knowledge already possessed. It compares this new experience with the old, tries to explain it and to assimilate it by interpreting it in the light of previous experiences. This mental process is known in the science of psychology as *apperception.* If an idea is closely related to something already well understood, the effort of apperception is so slight that we scarcely recognize it, or we may be entirely unconscious of it; but if the experience is new and important all ideas which relate to it are brought into consciousness and applied to the new object or phenomenon.

Before a new experience can be apperceived, we must obtain data concerning it. If it is a new sort of fruit, we bring to bear upon it all the senses, such as sight, touch, taste, smell. We then attempt to learn of its manner of growth, whether the plant is annual, biennial or perennial; whether it is an herb, shrub or tree, and whether it thrives in a warm or temperate climate. When these items of information are obtained, we are prepared to classify properly the new specimen and add it to our idea of fruit.

Its Value in Education. The proper understanding of the processes of apperception is very important in the formulation and application of sound methods of teaching. For in this connection it is well to remember the following important facts:

(*a*) The mind in mastering any new idea does it by going from what is known to the nearest related unknown. If a new kind of fruit is presented to the child, his first act is to discover its known qualities. It follows therefore that in teaching new subjects one has to take into

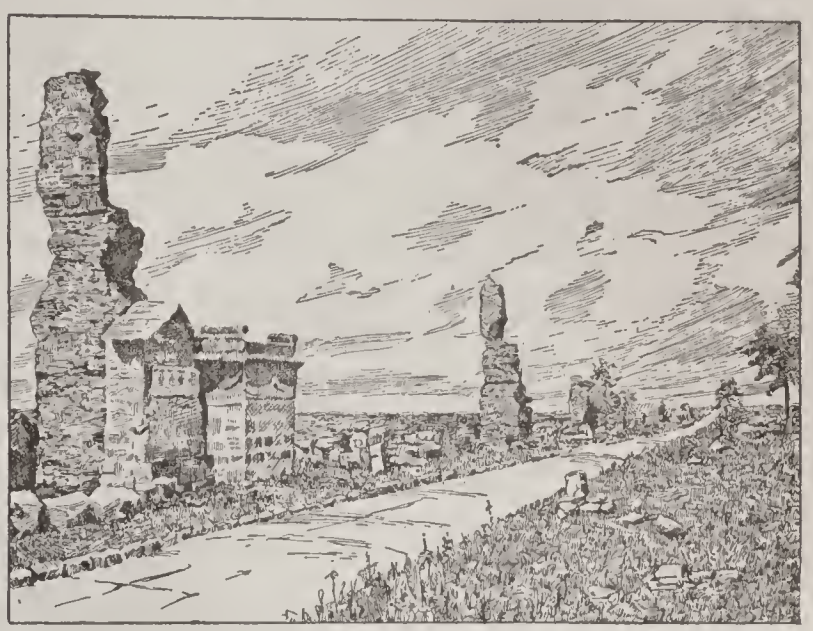
consideration the knowledge the child already possesses. Each bit of information or new knowledge must be so presented as to show the relation that exists between it and the facts already known and the relation of each of them as a whole. Only knowledge presented in such a way is of value because it can be thoroughly assimilated and combined with previous knowledge.

(b) When ideas are presented, the memory of past similar ideas will exert a modifying influence, and the tendency is to interpret the new idea by the old ideas which first come into consciousness. Every one interprets new ideas in the light of his special experience. The artist sees in a landscape material for a beautiful picture, while the farmer sees in the same landscape so much fertile soil suitable for cultivation.

See ASSOCIATION, LAWS OF; INTEREST; PERCEPTION. O.B.

APPETITE, *ap′ e tite.* This word, which in Latin means *desire* in general, is in English most commonly used to mean desire for food and drink. Just what is the physical cause of this craving which is felt at fairly regular intervals is not known, but physicians agree that in a healthy person it is the very best guide as to the time of eating and the amount to be eaten. One of the new health crusades is based on the principle that one should eat only when hungry, and then only just enough to appease the appetite. It is a good rule for anyone to eat slowly, so as to give the appetite a chance to become satisfied before too much has been eaten. Physicians hold that most people who are not engaged in hard manual labor stimulate their appetite artificially, and in this manner they overload the body and reduce their efficiency.

APPIAN, WAY, called the Queen of Roads, a famous highway of ancient times,



APPIAN WAY

Drawn from a photograph, showing its appearance in the twentieth century, twenty-two hundred years after its construction.

named from the Roman censor Appius Claudius, who began its construction in 312 B. C. Leading directly from the gates of Rome to Capua, in Campania, it was afterward extended to Beneventum, Tarentum and thence to Brundusium, on the southeast coast of Italy. This broad, historic highway, the *Via Appia* that the Latin student so often comes upon in his reading, was paved with huge blocks of lava, laid on a bed of broken stone cemented with lime, and it formed the chief thoroughfare for travelers from points east and south of Rome. Portions of the road are yet in use, and there still may be seen the ruins of many of the magnificent tombs that were built along its sides in the vicinity of Rome.

APPLE, the most profitable fruit of the temperate regions, and according to many authorities the most valuable in all the world. It is also the commonest and one of the oldest known; references to it are frequent in the literature of all countries and all ages. Popularly, it is identified with the "fruit of the tree of knowledge" eaten by Adam and Eve in Eden—

* * * * * * whose mortal taste
Brought death into the world, and all our woe,
With loss of Eden;

and the Greeks also made an apple, the famous Apple of Discord (which see), the cause of a great disaster. In general, however, it has received more favorable notice, for poets have loved to sing not only of the "apple blossoms white" which "hung in rich profusion" but of the "alluring fruit" as well. Bryant's *Planting of the Apple Tree* is a much-loved poem which sings of the beauties and uses of the tree itself.

The name is used, in combination, for various fruits which are not at all related to the apple. Rather startling, at first, seems Whittier's—

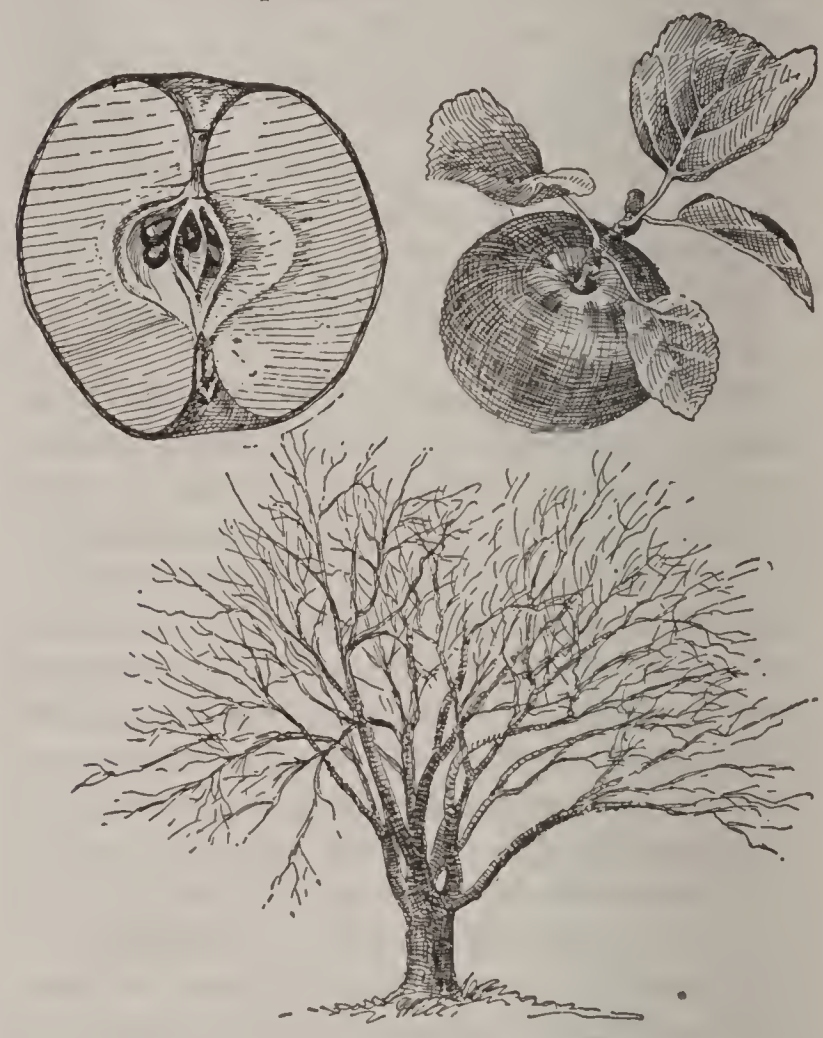
Let other lands, exulting, glean
The apple from the pine,

until there comes the realization that what is meant is the familiar pineapple, which is not an apple at all. The tomato was long known as a "love apple," and the "apple of Sodom" had an unenviable reputation which still persists. Just what this fruit was is not known, but ancient travelers in the East told of a beautiful, luscious-looking fruit which tempted the sight, but was but dust and ashes to the taste.

Related to the Rose. Like the peach, the cherry, the strawberry and the plum, the apple belongs to the rose family, and its exquisite blossoms, white or pink-tinted, are much like the first of the roses, the wild rose (see illustration later in this article). The smooth-skinned, juicy fruit, with its hard pulp and its core containing the horny seed cells is too well known to need description. Authorities tell of thousands of varieties which differ in color, in shape and in taste, but all these have been developed from two species—the common apple and the wild crabapple.

Beginnings of Apple Culture. The development has been slow, for remains of prehistoric civilization show that even in those far-distant times the apple was cultivated. The Romans knew and prized it, and probably introduced it into England. One of the early governors of Massachusetts Bay Colony performed a signal service to his newly adopted country by introducing the apple in 1629; for North America, the greatest apple-producing region in the world, had no native apples. As the colonists in the years that followed pushed their way westward they planted apple orchards everywhere; and a certain eccentric character earned fame and the name of Johnny Appleseed by traveling over Western Pennsylvania and Ohio scattering apple seeds. Wherever he came upon a fertile, well-watered spot, there he planted his seed, and the little orchards which sprang up he tended on his later visits. Fantastic as were his methods, certain parts of Ohio look upon him as a very real benefactor.

An Apple Orchard. The old unkempt orchards with their spreading, gnarly-limbed trees, thick with blossoms in the spring and shining with their oval, bright-green leaves, are most picturesque, but it is the carefully tended orchard that produces the best yield. The trees should be planted in rows from thirty to forty feet apart each way, that the full-grown branches may not interfere with one another. Careful pruning is an important factor, but one about which no specific directions can be given, as it differs according to the variety of apple and the locality. In general, the trees should not be allowed to attain a greater height than twenty-five feet, and the tops should be rounded and spreading.



THE APPLE

Below is the typical form of apple tree, as seen in winter. Above, shape of fruit and leaves and section showing core and seeds.

All about the roots of the trees the soil should be carefully cultivated until about the middle of July, but then tillage should cease. No attempt should be made except on richest soil to raise regular crops on orchard land, or to graze animals there, but it is well, at the time cultivation is abandoned, to plant clover, cowpeas, alfalfa or some such crop which, by demanding the strength of the soil, will stop the growth of the trees and allow the fruit to mature more slowly.

Where Apples Are Grown. No fruit in the world is more widespread than the apple, and no other can be successfully grown so far north, for its blossoms appear late in the spring and thus escape the frosts. Europe grows apples as far north as Scandinavia, and the temperate regions of the Southern Hemisphere have been found to be well adapted to their production, but it is North America which, as stated above, is the real home of the apple.

APPLE TREES IN BLOOM.

Every tear is answered by a blossom,
Every sigh with songs and laughter blent,
Apple-blooms upon the breezes toss them.
April knows her own and is content.

—COOLIDGE.

United States. The United States is the greatest apple-growing country in the world, and produces annually over 200,000,000 bushels, of which by far the larger proportion is used within the country. New York produces almost a fifth of the total crop, Michigan ranks second among the states, Pennsylvania, third and Missouri fourth. The apples of the Piedmont valley in Virginia have long been celebrated for their juiciness and their excellent flavor. Of late years the Northwestern states, notably Montana, Oregon, Washington and Idaho, have made vast strides in the industry; if the increase continues the Eastern states will not long be sure of their supremacy. The proportion of apples harvested to the number of trees is low as yet in these Western states, for many of the orchards there are young, and some varieties do not produce fruit until they are ten years old. The western apples are of a beautiful rich color, so dark at times as to look almost black. The finest apples are raised in irrigated regions, and they are as carefully harvested, graded and packed as are oranges in California or Florida.

Canada. In Canada the apple is rapidly becoming the chief fruit. In 1871 the apple crop amounted to but 6,000,000 bushels, while in 1915 it was over 21,000,000. Ontario leads in apple production, its orchards yielding more than half of the crop of the Dominion. A considerable part of the Ontario apples is sent to the Western province, though some of these are developing a rapidly-increasing industry of their own. Ontario also exports to Great Britain more apples than any other province or state in North America.

How Grown. Apple seeds, if planted in the proper soil, will grow and produce apples, but the fruit will not be the same kind as that from which the seed was taken, and will, moreover, be decidedly inferior. Good varieties of apples, therefore, are usually secured by grafting (which see) and by far the larger part of this is done in nurseries. The plants to be grafted upon are raised from seed, but the buds to be grafted are taken from a tree that is known to produce excellent fruit of the variety desired. No matter of what kind the seedling is, if a northern spy bud be grafted upon it the full-grown tree will produce northern spies; if the bud be from a maiden blush tree, maiden blush apples will develop. A farmer wishing to start an orchard buys from a nurseryman trees which are one, two or more years old. These, if properly cared for, will live and produce for a long time, an orchard thirty years old frequently being still in fine bearing condition.

Kinds. Of the very numerous varieties of apples produced in North America, not more than one hundred are really profitable, and usually not over twenty varieties are successful in any one region. The kinds which do well

RELATED BLOSSOMS

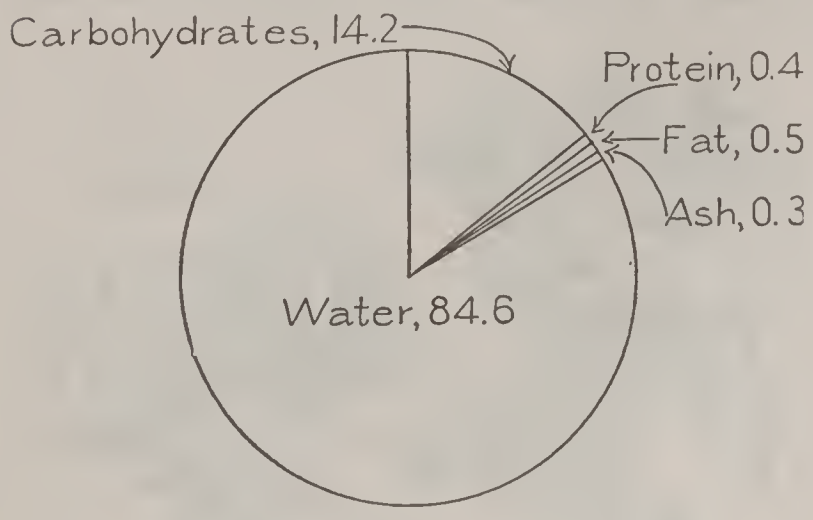
The apple belongs to the rose family. The flowers prove the relationship; *a* is the apple blossom; *b*, the wild rose.

in Canada and the northern part of the United States usually do not thrive in Missouri and Southern Illinois, and those which yield plentifully in Virginia seem ill-adapted to the irrigated Western lands. Whenever apple culture is begun in a new locality, trials have to be made to determine which varieties best suit the peculiar soil conditions of the region. In general, the warmer apple-growing regions succeed best with the early fruit, while the colder regions produce the best late fruit, or winter apples. The larger number of apples in the market to-day are of this latter variety—that is, they are left on the trees as long as there is no danger of their being frozen. They do not, like the softer peaches and plums, rot on the trees.

It is impossible to mention all or even many of the common varieties of apples, but a few of the favorites are the northern spy, the pippin, the russet, the Jonathan, the Spitzenberg, the winesap, the bellflower, the snow apple, the Baldwin, the greening, the duchess and the maiden blush. The two last named are tart summer apples, not as good as some others for eating. The Ben Davis is raised in great quantities because it is easy of cultivation

and keeps well, but it is not the best variety either for eating raw or for cooking.

Uses and Food Value. Since winter apples may be kept in cold storage, or even in cool, dry cellars until the earliest summer apples are on the market, it is possible to have apples the entire year. And no fruit is more gener-



FOOD VALUE

The figures show the percentage each ingredient bears to the whole. See Food, subtitle *Chemistry of Food.*

ally welcome. The choicest apples are for the most part eaten raw, but the housewife finds almost innumerable uses for them in cookery, delicious jelly, sauces, pies, puddings and dumplings being produced from them. The inferior grades are either canned or dried before being placed on the market, or are made into cider, from which in turn the best vinegar is made.

Apples are one of the most wholesome of fruits—a fact that is recognized in the old rhyme—

> An apple a day
> Keeps the doctor away.

This does not mean that they have high nutritive value, for like most fresh fruits they are largely water. To replace one egg in food value, fully two and one-half pounds of apples would be needed. The water which they contain, however, and the vegetable acid make them excellent regulators of the system. Dried or evaporated apples, like most dried fruits, have a higher nutritive value than fresh, but they have not the refreshing, tonic qualities.

Seedless Apples. Two scientists, John F. Spencer of Grand Junction, Col., and Luther Burbank, have worked successfully to produce an apple in which there is no core. The seedless apples are firm, juicy and of good color, and lack entirely the horny receptacles that surround the seeds in ordinary apples. But it is not merely this that makes this new fruit valuable and bids fair to make it very important in apple-culture in the near future. The tree is blossomless, having only stamens and a small quantity of pollen, and while this fact robs it of its springtime glory of white and rose, it frees it also from one of the worst apple pests—the codling moth (which see), for it is on the blossom that the moth lays its eggs. Thus wormless apples are practically assured.

Diseases of Apple Trees. *Apple rust* and *apple scab* are the most troublesome diseases to which apples are subject. The former is caused by a fungus which appears as yellow spots on the leaves and also attacks the little apples in May and June, and the only safe method of prevention is a thorough spraying of the trees with Bordeaux mixture as soon as the leaves appear (see Insecticides and Fungicides). Cedar trees should not be allowed to exist in the neighborhood of apple orchards, for the rust fungus develops on the cedars.

Apple scab, the result of another fungus, produces dark spots on leaves, flowers and fruit, the growing apples often becoming ill-shaped

APPLE SCAB

Appearance of diseased fruit and leaves.

and cracked. This is the most serious of the apple diseases, and the most widespread in its scope, appearing everywhere in apple regions. Bordeaux mixture is the remedy for this, too, but one spraying is not sufficient. Beginning at the season when the flower buds are swelling, there should be three applications at intervals of ten days. If these can be given in rainy weather results are better, for it is the dampness which destroys the fungus.

Insect Pests. The codling moth, referred to above, is the most destructive enemy of the apple, but the apple-tree borer is a close second. There are two kinds of beetle grubs that go by this name—a round-headed borer and a

OUTLINE AND QUESTIONS ON THE APPLE

Outline

I. Plant Family

(1) The most important fruit of the rose family
(2) Blossoms
(3) The crab apple and common apple

II. Apple Culture

(1) Cultivated by earliest historic peoples
(2) Popularly known as the fruit of the Garden of Eden
(3) Prized by Greeks and Romans
(4) Widely cultivated throughout Europe as far north as Scandinavia
(5) Introduction into the United States
(6) Growth of apple culture in the United States
(7) Cultivation in Canada

III. Methods of Cultivation

(1) The planting of trees
(2) Pruning
(3) Cultivation of the soil
(4) Grafting
(5) Seedless apples

IV. Varieties

(1) Differ in various localities
(2) Common varieties

V. Diseases and Pests of Apple Trees

(1) Apple rust
(2) Apple scab
(3) The codling moth
(4) The round-headed borer
(5) The flat-headed borer
(6) Means of prevention

VI. Uses and Food Value

(1) Eaten raw
(2) Cooked in various ways
(3) Dried
(4) Canned
(5) Cider and vinegar
(6) Wholesomeness

Questions

What relatives of the apple appear on our tables?

Which would you rather have, all the apple orchards in the world or all the orange groves? Why?

If you save the seeds from your choicest Jonathan apples and plant them, will you in time have an orchard of Jonathan apples?

Why can apples be grown farther north than any other kind of fruit?

What is a "love apple"?

If you went into an orchard early in June and saw the ground heavily carpeted with alfalfa, would you think the farmer knew his business?

Who was Johnny Appleseed?

Why are the trunks of apple trees sometimes whitewashed?

If you had an apple tree that produced very satisfactory fruit and wanted others like it, how would you go about securing the same kind?

What has the apple to recommend it as a food besides its flavor?

Is an orchard in which seedless apples are produced as beautiful in the spring as an ordinary orchard? Why?

What are the peculiar advantages of the seedless variety?

What drink is made from apples?

Describe briefly the process of manufacture.

Which province of Canada produces the largest apple crop? Which state of the American Union?

Were apples native to the continent which is now foremost in their production?

What part did the apple play in the legends of the Hebrews and in those of the Greeks?

flat-headed borer, and the former is the greater pest. If the beetles can be prevented from laying their eggs on the bark, the danger is prevented, for the grubs do not themselves seek out the trees. Painting the lower part of the tree during the egg-laying months of June and July with whitewash or with fish-oil soap is usually effective. No spraying can rid trees of the borers once they have been hatched; they must be dug out patiently one by one. C.H.H.

Consult Waugh's *The American Apple Orchard;* Woolverton's *Canadian Apple-Growers' Guide.* An older work, but standard, is Bailey's *Field Notes on Apple Culture.*

APPLE OF DISCORD, the wonderful golden apple, in the tales of mythology, destined to be the real cause of the Trojan War. It bore the words "For the fairest," and was thrown by the goddess of discord into an assembly of the gods. Juno, Venus and Minerva all claimed it, and when the Trojan Paris, chosen judge, gave it to Venus, Juno became so jealous that she determined to destroy the Trojan race. Nor did she cease her plots until she had done as she planned. See PARIS; TROY.

APPLETON, *ap' 'l ton,* WIS., the county seat of Outagamie County, noted for its large paper and paper-pulp mills. It is situated on the Fox River, in the eastern part of the state about midway between the northern and southern state lines. Green Bay is thirty miles northeast, Fond du Lac is thirty-nine miles south and Milwaukee is 100 miles southeast. Railway transportation is provided by the Chicago & North Western and the Chicago, Milwaukee & Saint Paul railways; trolley lines communicate with cities in the Fox River Valley as far as Green Bay and there is steamer connection with Lake Winnebago, south, and with Lake Michigan through Green Bay. The place was settled in 1845 and was incorporated as a city in 1857. It was named in honor of Samuel Appleton of Massachusetts, who owned part of the original town. The commission form of government was adopted in 1910. The population increased from 16,773 in 1910 to 19,561 in 1920, Germans forming the greater part of the foreign element. The area is six and one-half square miles.

Appleton is located near the rapids called *Grand Chute,* which at this point have a descent of fifty feet and furnish ample power for manufacturing purposes. By a series of dams the river is made navigable for steamboats. The city ranks with the leading paper producing centers of the United States; besides this industry it is extensively engaged in making farm implements, furniture, dyes, knit and woolen goods. Appleton was one of the first cities in the United States to have electric street railways. Besides its public schools it has Appleton Collegiate Institute, Lawrence College (changed from a university in 1908) and a public library. The city owns its water works and has five parks. G.F.C.

APPRENTICE, *a pren' tis,* one who is bound by an agreement to serve another for the purpose of learning a trade. When Benjamin Franklin was a boy his father made an agreement with Benjamin's older brother that the latter should take the boy, give him a home and teach him the printer's trade. By this agreement Benjamin became an *apprentice* to this brother, who in law would be known as his master. Such instances were extremely common in the day in which Franklin lived.

By the terms of an apprenticeship agreement, the master furnishes the apprentice with a home, and teaches him the trade in which the master is engaged. The apprentice is to obey the master and to give him his services as long as the agreement lasts. A person under age, that is, a minor, may of his own accord agree to become an apprentice, but his parents or guardian must consent to the agreement. An agreement for apprenticeship cannot be bought or sold. The time for which the agreement is made depends to some extent upon the trade to be learned; seven years was the maximum. Formerly nearly all trades were learned in this way, but the introduction of machinery has practically set aside this method of learning trades in England, Canada and the United States.

Naval Apprentice. There is a system of apprenticeship in the United States navy, by which boys fifteen and seventeen years of age may be admitted to the navy and serve until they are twenty-one. During the first year the naval apprentice receives $9 a month; during the second year he receives $15 and during the third and following years $21.

APRICOT, *ay' pri kot,* one of the fruits containing stony seeds, grown on a tree belonging to the same family as the rose, and cultivated in all temperate regions. It is a native of Armenia and other parts of Asia, also of Africa. The tree is low and has heart-shaped leaves; the fruit is sweet, juicy, of a yellowish color, a little smaller than a peach, which it resembles in delicacy of flavor. Apricots are extensively

grown in the United States, especially in California, where vast quantities are sent fresh to

APRICOT, FRUIT AND LEAVES

market, the bulk of the crop being preserved in cans. The average value of the annual apricot crop in the United States is $3,000,000, California alone producing about 4,070,000 bushels valued at $2,800,000. The combined crops of all the other states of the Union total only about 100,000 bushels.

Apricot trees are subject to a disease known as *leaf rust,* which if not checked, entirely destroys fruitfulness. Careful spraying with germicides is the safest remedy. The stone of the fruit contains a bitter kernel, from which oil is extracted and from which the French make a liqueur. Fresh apricots have a fuel value of 270 calories per pound; as a heat producer their value is greatly increased when dried, being then equal to 1,290 calories per pound (see CALORIE). The actual food value of dried apricots exceeds that of dates, which have long enjoyed the reputation of being the most nutritious of fruits. Apricots contain 4.7 per cent protein, while dates only contain 1.9 per cent. See PROTEIN.

APRIL, one of the loveliest months of the year, has a name that is especially fitting, for it comes from a Latin word meaning *to open.* It is the time of opening buds. Some learned scholars declare that the Romans never named their months in this poetic manner; but those who defend the theory are just as learned, and the beautiful idea may have the benefit of the doubt. The special flower of April is the daisy, and its gem is the diamond.

April's Place in the Year. April is the fourth month in the year. Originally, in the time of the Romans, it had but twenty-nine days, but when the calendar was revised in the time of Caesar it was found that there were ten extra days to be distributed among the months, and of these April received one (see CALENDAR). It is thus one of the thirty-day months, and so crowded is it with nature's activity that not a month in the year makes a greater change in the appearance of the out-of-door world. At the beginning of April in northern climes snow is often lingering in the hollows, and frequently a sharp frost comes and binds fast the little brooks that have been striving so hard to throw off winter's shackles. But April's sun is warm and bright, and no frost and snow can long hold out against it.

It is a season of new life everywhere. Grass grows freshly green; trees and shrubs that have seemed dry and dead put out tiny leaves, and little twigs can no longer be snapped off sharply, for the sap is flowing in them and they have acquired a new strength and a new resistance. Early wild flowers push their way through the grass of the meadow or the thick forest carpet of last year's dead leaves, and on lawns and in gardens the crocuses and snowdrops appear. The birds have set out on their northward journey, and almost everything which makes summer delightful has at least started.

This transition month is specially known for its changing weather. Occasionally there are days so cold that they seem to have been left behind by winter, or days so hot that they are advance-couriers of summer; but the most

APRIL CALENDAR

Birthdays

1. Prince von Bismarck, 1815.
2. Hans Christian Andersen, 1805.
3. Washington Irving, 1783.
5. Algernon Charles Swinburne, 1837.
6. Elihu Yale, 1649.
7. William Wordsworth, 1770.
10. William Hazlitt, 1778.
11. George Canning, 1870.
12. Henry Clay, 1777.
13. Thomas Jefferson, 1743.
15. Bliss Carman, 1861.
16. Charles W. Peale, 1741.
17. J. Pierpont Morgan, 1837.
18. George H. Lewes, 1817.
19. Roger Sherman, 1721.
20. Sir John Eliot, 1592.
21. Friedrich Froebel, 1782.
22. Henry Fielding, 1707.
23. William Shakespeare, 1564 (uncertain).
    James Buchanan, 1791.
    Stephen A. Douglas, 1813.
24. Anthony Trollope, 1815.
25. Oliver Cromwell, 1599.
26. Alice Carey, 1820.
27. U. S. Grant, 1822.
28. James Monroe, 1758.
29. Duke of Wellington (perhaps May 1), 1769.

Events

1. Construction of first railroad in United States begun, 1826.
   Four provinces of British India officially reconstituted, 1912.
2. United States mint established, 1792.
   Richmond, Va., evacuated by Confederates, 1865.
3. Bismarck resigned his office, 1877.
4. Henry Hudson sailed on third voyage, 1609.
   United States flag adopted by Congress, 1818.
5. British Museum originated, 1753.
6. Washington elected President of United States, 1789.
   United States entered war against Germany, 1917.
7. Canada defeated reciprocity with United States, 1888.
8. Legislature of British Columbia passed anti-Japanese immigration law, 1905.
   Louisiana admitted to the Union, 1812.
9. Charleston, S. C., captured by British, 1780.
10. Napoleon abdicated French throne, 1814.
    Huge fire in Toronto, Canada, 1904.
11. William and Mary Crowned in London, 1689.
    Hudson Bay, Newfoundland and Nova Scotia surrendered to England, 1713.
12. Union Jack made English national flag, 1606.
13. Edict of Nantes signed by Henry IV of France, 1598.
14. First anti-slavery society in United States, formed by Quakers, 1775.
    President Lincoln shot by J. Wilkes Booth, 1865.
15. *Titanic* sank, and about 1,600 persons were drowned, 1912.
16. First railroad in India opened, 1853.
18. Paul Revere made his famous ride, 1775.
    Earthquake and fire in San Francisco, 1906.
19. Battle of Lexington, 1775.
20. Bacon's Rebellion began, 1676.
21. Canada forbade seal-catching in certain areas, 1894.
    Spanish-American War began, 1898.
22. Contract signed for transfer of Panama Canal to the United States, 1904.
24. Russia began war against Turkey, 1877.
    Battle of Fish Creek, Canada, 1885.
25. Japan opened Yeddo and other ports to trade, 1867.
    Allied forces landed on both sides of the Dardanelles, 1915.
26. Great plague in London began, 1665.
    Hull, Canada, nearly destroyed by fire, 1900.
28. Napoleon exiled to Elba, 1814.
30. George Washington inaugurated as President of the United States, 1789.
    Louisiana Purchase made, 1803.

For Study

1. Arbor Day.
2. Arbutus.
3. Audubon, John James.
4. Bird Day.
5. Bird Houses.
6. Bluebird.
7. Bulbs.
8. Clouds.
9. Cocoon.
10. Corn-planting.
11. Crocus.
12. Daffodil
13. Dandelion.
14. Earthworm.
15. Easter.
16. Frog.
17. Hepatica.
18. Hyacinth.
19. Insecticides.
20. Jack-in-the-pulpit.
21. Landscape-gardening.
22. Leaf Buds.
23. *Paul Revere's Ride.*
24. Rain.
25. Rainbow.
26. Robin.
27. Roots.
28. Tree-planting.
29. Tulip.
30. Wren.

QUOTATIONS FOR APRIL

1. The first of April, some do say,
Is set apart for All Fool's day;
But why the people call it so
Nor I, nor they themselves, do know.
—*Poor Robin's Almanac.*

2. April cold with dropping rain
Willows and lilacs bring again,
The whistle of returning birds
And trumpet-lowing of the herds.
—*Emerson.*

3. Dare to be true; nothing can need a lie;
A fault which needs it most, grows two thereby. —*Herbert.*

4. April is here!
Listen, a bluebird is caroling near!
Low and sweet is the song he sings,
As he sits in the sunshine with folded wings. —*Rexford.*

5. If a task is once begun,
Never leave it till it's done;
Be the labor great or small,
Do it well, or not at all.
—*Phoebe Cary.*

6. I have found violets, April hath come on,
And the cool winds feel softer, and the rain
Falls in the beaded drops of summer time. —*Willis.*

7. I wandered lonely as a cloud
That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host of golden daffodils.
—*Wordsworth.*

8. Gladness is born of the April weather,
And the heart is as light as a wind-tossed feather. —*Rexford.*

9. Now the bright crocus flames, and now
The slim narcissus takes the rain,
And, straying o'er the mountain's brow,
The daffodillies bud again. —*Long.*

10. Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labor and to wait.
—*Longfellow.*

11. A gush of bird song, a patter of dew,
A cloud and a rainbow's warning,
Suddenly sunshine and perfect blue—
An April day in the morning.
—*Spofford.*

12. I would rather be right than be President. —*Clay.*

13. The God who gave us life, gave us liberty at the same time.
—*Jefferson.*

14. Every tear is answered by a blossom,
Every sigh with songs and laughter blent;
Apple-blooms upon the breezes toss them
April knows her own and is content.
—*Coolidge.*

15. He who feeds men, serveth few;
He serves all, who dares be true.
—*Emerson.*

16. Sweet April showers
Do bring May flowers. —*Tusser.*

17. Truth crushed to earth shall rise again;
The eternal years of God are hers.
—*Bryant.*

18. April's coming up the hill!
All the spring is in her train,
Led by shining ranks of rain.
—*Dodge.*

19. ——that soft time of sunny showers,
When the wide bloom, on earth that lies,
Seems of a brighter world than ours.
—*Bryant.*

20. Truth is as impossible to be soiled by any outward touch as the sunbeam.
—*Milton.*

21. Sweet April! many a thought
Is wedded unto thee, as hearts are wed.
—*Longfellow.*

22. When proud-pied April, dress'd in all his trim,
Has put a spirit of youth in everything.
—*Shakespeare.*

23. If I say that Shakespeare is the greatest of intellects, I have said all concerning him. —*Carlyle.*

24. When wake the violets, Winter dies;
When sprout the elm-buds, Spring is near;
When lilacs blossom, Summer cries,
"Bud, little roses, Spring is here."
—*Holmes.*

25. Speak ye every man the truth to his neighbor. —*Bible.*

26. I hold that man had better be dead
Than alive when his work is done.
—*Alice Cary.*

27. I propose to fight it out on this line if it takes all summer. —*Grant.*

28. The sweet hepatica has heard,
And troops of daffodils
Are throwing kisses to the light,
And nodding to the rills. —*Wilson.*

29. The ill-timed truth we might have kept,
Who knows how sharp it pierced and stung?
The word we had not sense to say,
Who knows how grandly it had rung?
—*Sill.*

30. Observe the postage stamp! Its usefulness depends upon its ability to stick to one thing until it gets there.
—*Billings.*

distinctive feature of April is its showers. Changes from flashing sunlight to pouring rain are frequent, and William Watson's lines—

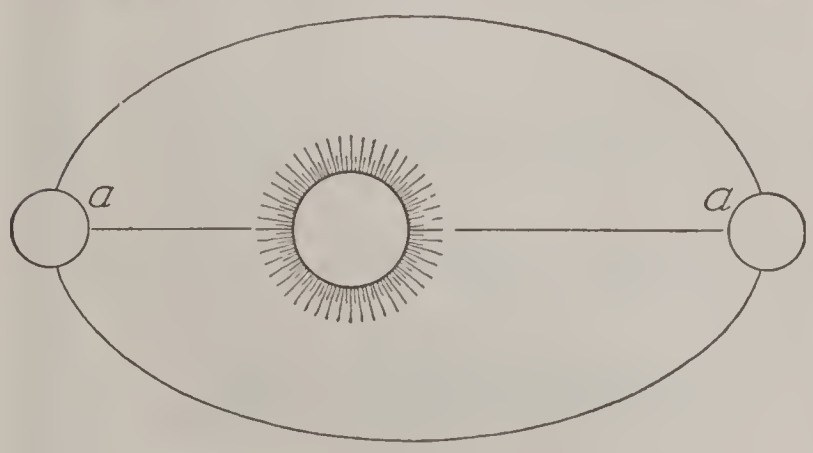
> April, April,
> Laugh thy golden laughter,
> But, the moment after,
> Weep thy golden tears!

give as good a picture of the month as can be expressed in words.

April has played a curious part in United States history, for nearly every war in which the country has been involved has begun in this month—the Revolution, the Mexican War, the War of Secession, the Spanish-American War, and the War of the Nations. This last war did not begin in that month, but in April the United States entered it.

Special Days. April has several special days. The first day is April Fools' Day, or All Fools' Day (which see); it is not a holiday, but a time dear to children by reason of the sanction it gives to mischievous, harmless pranks. Almost always Easter falls in April, and fittingly, too, for it is the symbol of that broader new life of which April represents one phase. Canada has no fixed days in this month for celebration, but many states in the American Union have set aside one day for the planting of trees and have called it Arbor Day (which see).

APSIDES, *ap' si deez,* in astronomy, two points in the orbit of a heavenly body, one farthest away from, the other nearest to the body about which it revolves. This is most clearly illustrated by the point at which the



APSIDES

moon is at its greatest distance from the earth and the point at which it is nearest. An imaginary line drawn between these two points is called the *line of apsides.* The accompanying diagram shows the apsides at *a a.*

When the moon is at its nearest approach to the earth it is said to be in *perigee* (meaning *around or near the earth*); when most distant, in *apogee* (meaning *away from the earth*). The earth is in *perihelion* (meaning *around or near the sun*) when nearest the sun; in *aphelion* (meaning *away from the sun*), when at its extreme distance from it. The line of apsides has a slow forward and westward motion in the plane of the orbits of all planets, except in that of Venus, when the motion is reversed. This is due to what is called *precession* (see PRECESSION OF THE EQUINOXES).

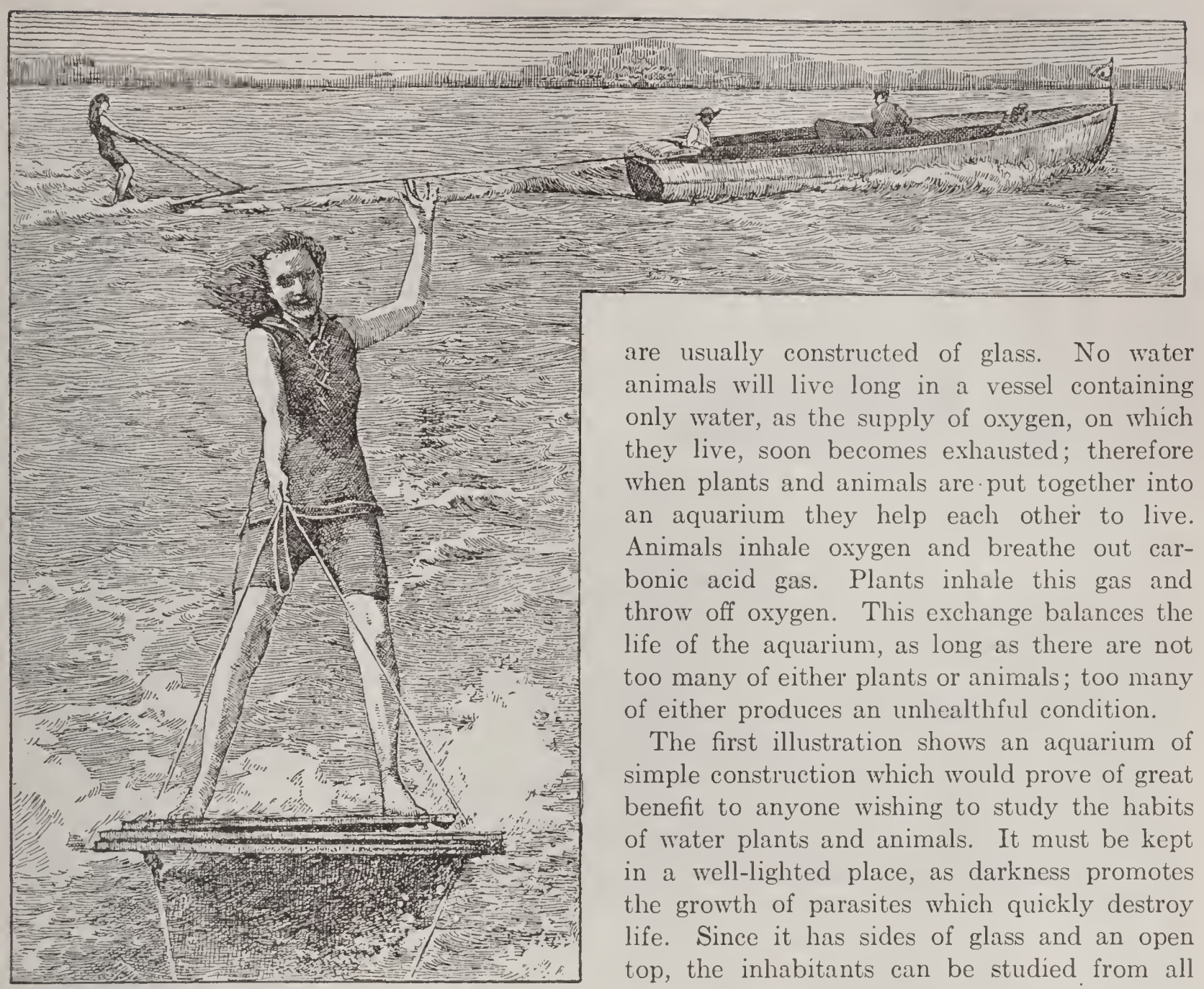
APTERYX, a bird about the size of a hen, without wings or tail and having a long, slender beak, with nostrils near the tip. Its plumage, of a grayish brown color, is more like hair than feathers. It is a very timid bird, hiding

THE APTERYX
It is about seven inches in height.

by day and feeding at night on worms, insects and seeds. In a burrow it scratches a nest, where it lays two large, white eggs. The natives of New Zealand call it *kiwi-kiwi,* on account of its peculiar cry. It is fast becoming extinct, as it breeds very slowly and great numbers are destroyed by natives, who are particularly fond of its flesh.

AQUAMARINE, a fine and transparent variety of beryl much prized as a gem, of a blue or sea-green color. The stone is found in Siberia and Brazil, and in the United States in Colorado and North Carolina. According to an old superstition the aquamarine was worn to counteract the effects of poison. With the bloodstone it is a birth gem for March. See BERYL.

AQUAPLANING, *ak' wa playn ing,* a new and exhilarating sport enjoyed by water enthusiasts who desire something more exciting than swimming. The aquaplane is a small raft attached by a rope to the stern of a swiftly-moving motor boat. Another rope, the ends of which are fastened to the front corners of the raft, serves as a driving rein and sup-



AQUAPLANE AND RIDER
Picturing a delightful summer sport

port for the aquaplanist, who stands upright on the back edge of the plane. Only experienced swimmers should attempt this sport, which grows more and more fascinating but also more dangerous as the speed of the boat is increased, for whenever the aquaplanist loses his balance he is thrown at once into the water. Both men and women enjoy this method of bounding over the waves, which may have been suggested by the "shoot-the-chutes," so popular in pleasure parks, or by the more picturesque sport of the Hawaiians—riding the surf.

AQUA REGIA, the name applied to a mixture of nitric and hydrochloric acids. Its name (from the Latin), meaning *royal water,* refers to its property of dissolving gold, the royal metal of the alchemists. The mixture is usually made by combining one part of nitric acid with from three to four parts of hydrochloric.

AQUARIUM, *a kwa' ri um,* a tank or basin in which are kept living specimens of marine or fresh-water plants and animals. The sides are usually constructed of glass. No water animals will live long in a vessel containing only water, as the supply of oxygen, on which they live, soon becomes exhausted; therefore when plants and animals are put together into an aquarium they help each other to live. Animals inhale oxygen and breathe out carbonic acid gas. Plants inhale this gas and throw off oxygen. This exchange balances the life of the aquarium, as long as there are not too many of either plants or animals; too many of either produces an unhealthful condition.

The first illustration shows an aquarium of simple construction which would prove of great benefit to anyone wishing to study the habits of water plants and animals. It must be kept in a well-lighted place, as darkness promotes the growth of parasites which quickly destroy life. Since it has sides of glass and an open top, the inhabitants can be studied from all points. Each fish three inches long requires one gallon of water. Two or three very small fish will find one gallon sufficient, but the aquarium must not be overcrowded. The bottom should be covered with an inch of clean sand, and plants should be placed appropri-

AN EASILY BUILT AQUARIUM
Even the smallest schools can afford an aquarium of this simple construction.

ately, usually near the corners of the aquarium. If the fish move about quietly below the

An aquarium any mother can easily provide for the children at home.

surface they are comfortable, but if they come to the surface and gasp, the water does not contain enough oxygen and some animals must be taken out or more plants must be put in. The second illustration shows what may be accomplished in any home in the study of small water life and what may result from it.

The following is a reliable recipe for making a cement that will render an aquarium watertight. Mix one-third litharge to two-thirds red lead (powdered) with raw linseed oil to the consistency of putty. The litharge and red lead should be thoroughly mixed and freed from all lumps before mixing the oil.

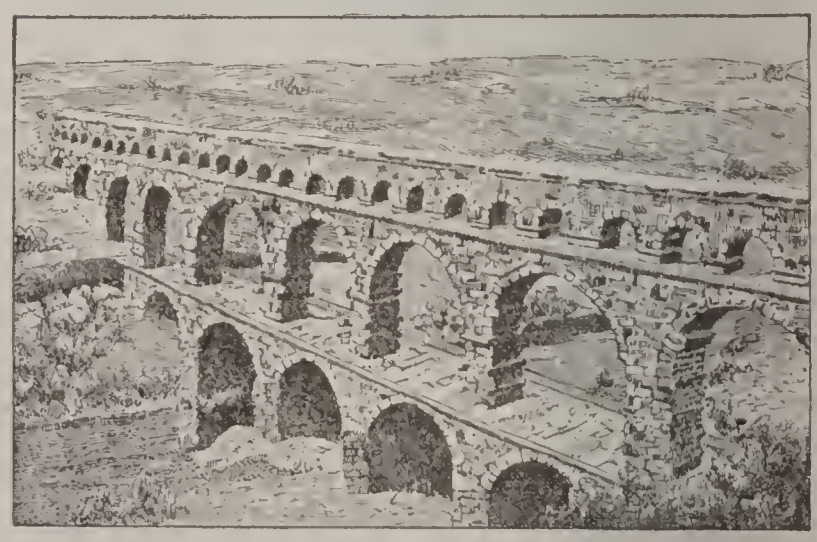
Public Aquariums. Many large cities now have large aquariums where aquatic life may be studied and which attract large numbers of visitors. One of the largest aquariums in the world is in New York, in the famous building on the Battery, formerly known as Castle Garden, where millions of emigrants to the United States have landed. It contains 150 tanks for small fish and a number of big pools for sharks and other large and dangerous fish. The aquariums of the American Fish Commission at Washington, and those at Naples, Petrograd, Paris, Hamburg and Brighton (England), are also of great educational value. The one at Petrograd has been maintained for more than 150 years. G.W.

AQUARIUS, *a kwa' ri us,* meaning *water bearer,* is the name given in astronomy to a constellation and the original eleventh sign of the zodiac, which now occupies the position of the twelfth sign, owing to the forward motion of the equinoxes (see PRECESSION OF THE EQUINOXES). The sun is in the zodiacal sign Aquarius during parts of January and February. The name was given on account of the rains that fall so plentifully in Italy during that season. The symbol of Aquarius is ♒, signifying running water. See ZODIAC, for illustration.

AQUATIC, *a kwat' ic,* **PLANTS.** See WATER PLANTS.

AQUEDUCT, *ak' we dukt,* an artificial channel for the conveyance of water from one place to another. In general use, however, the term is restricted to a system for supplying a city with water from a distance, and to a stone, concrete or metal channel in which the downward grade is sufficient to cause the water to flow by gravity. Modern aqueducts frequently combine such gravity channels with other sections in which water is pumped or forced through other pressure.

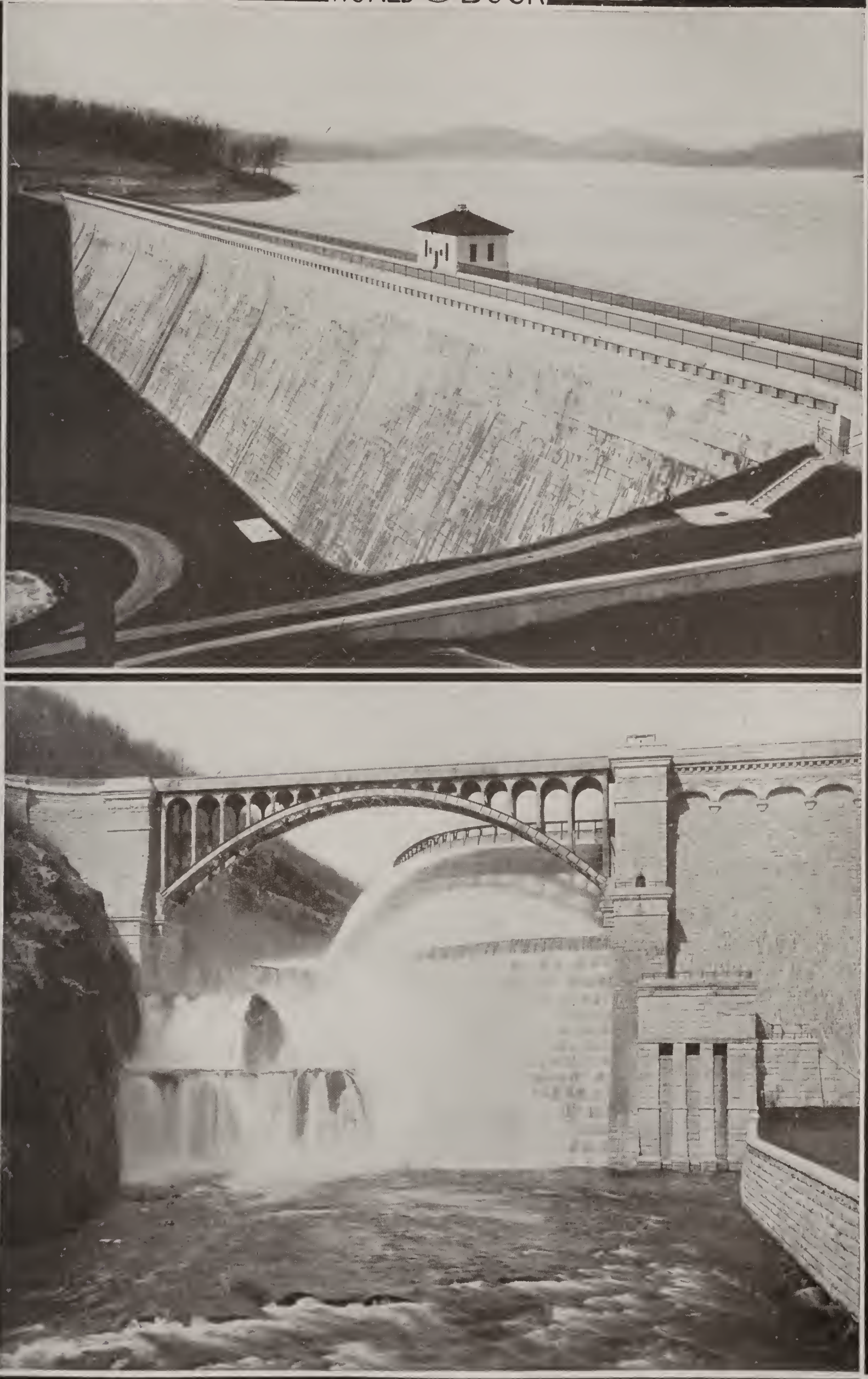
Aqueducts were in use among the ancient Egyptians, Phoenicians, Persians and Greeks, but they were most common in the Roman Empire, where they reached astonishing proportions. Ancient Rome was supplied with water by eleven great aqueducts, parts of which were carried on high bridges which still stand as monuments of Roman art and engineering. Two of these are used to-day to supply water to the modern city of Rome. In many other parts of Europe, from Constantinople to Nimes, France, are ruins of aqueducts built



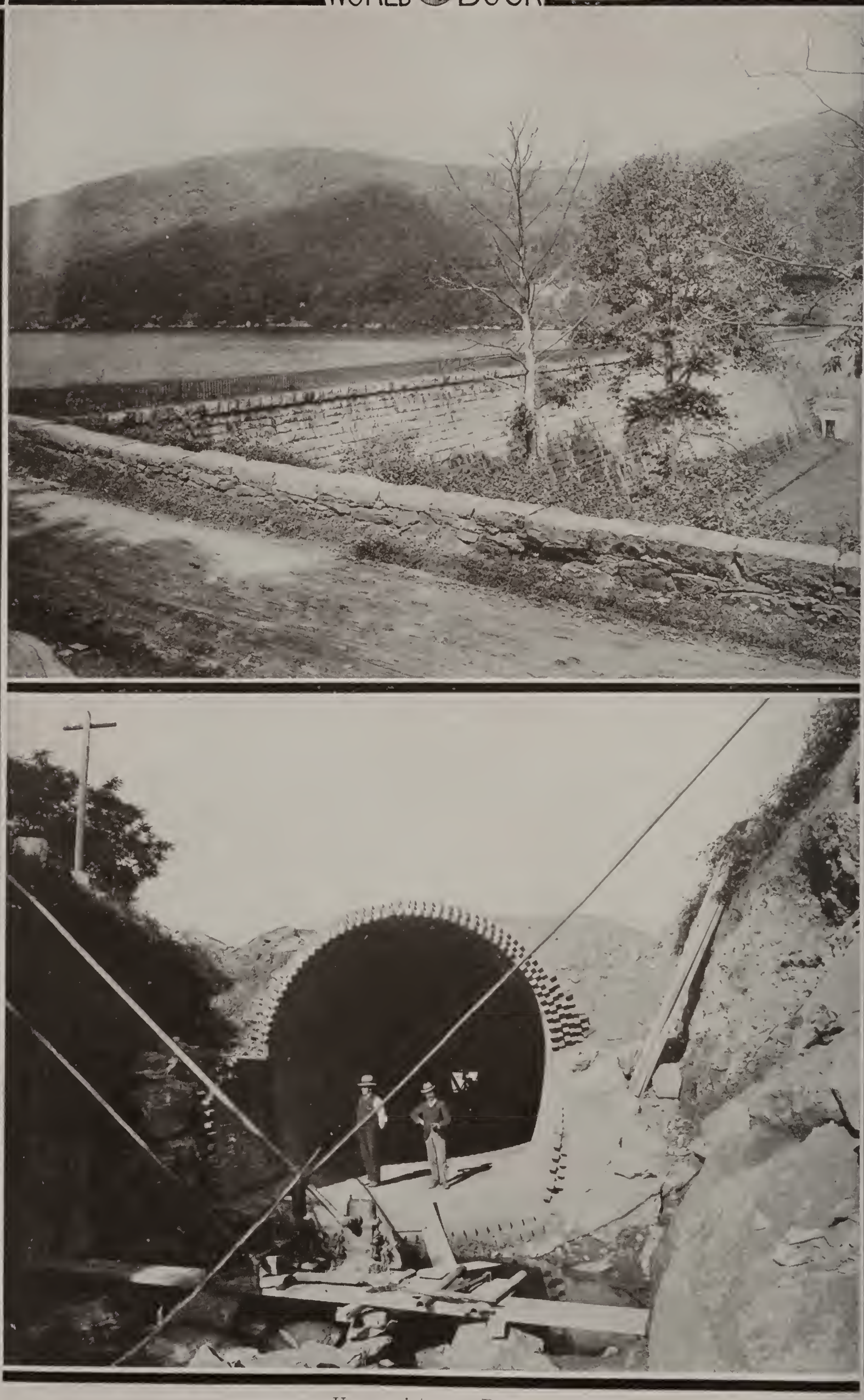
AT NIMES

by the Romans. The Pont du Gard, fourteen miles from Nimes, is unrivalled for boldness of design. It is built of huge blocks of stone, and consists of three tiers of arches across the valley of the River Gardon. Each large arch in the two lower tiers has a span of sixty and seventy-five feet, respectively, and the height of the structure is 160 feet. The aqueduct at Segovia, Spain, built by the Romans in the first century after Christ, has two tiers of arcades, which reach a height of 102 feet. It is 2,400 feet long, and is one of the most admired works of antiquity.

The Story of Modern Aqueducts. During



CROTON AQUEDUCT. Upper picture, main dam at Croton Falls Reservoir. Lower, new Croton Dam.



CROTON AQUEDUCT. Upper picture: Dam at Boyd's Corners. Lower: Size of aqueduct north of Jerome Park, near the Bronx.

the Middle Ages the construction of aqueducts almost completely ceased, but with the Renais-

AN AQUEDUCT OF NERO

sance came a new development. The Popes at Rome restored some of the ancient structures which had fallen into disuse, and several new ones were built in France. One of the most remarkable of these was begun by Louis XIV in 1684 to carry water from the Eure River to Versailles. Forty thousand soldiers worked four years on this task, which was never completed because war broke out in 1688. Most ancient aqueducts were of stone, or of brick and concrete, but the extensive use of iron and steel pipes has now rendered the construction of aqueducts of the old type unnecessary. Gravity is now frequently aided by pressure, and the aqueduct bridges are usually supplanted by inverted siphons (see SIPHON). The bridge form, however, is still used not only for supplying water to towns, but also in many irrigation projects.

One of the first of the great aqueducts built by European cities was that from Loch Katrine to Glasgow, completed in 1860. Manchester, England, is supplied by an aqueduct, completed in 1892, nearly ninety-six miles long. Of this length thirty-six miles are concrete conduit, fourteen and one-half miles of concrete tunnels, and forty-five miles of iron pipe. Liverpool, Vienna, Paris and many other cities have long aqueducts.

Croton Aqueduct. In the United States the first important aqueduct was the old Croton, completed by New York City in 1842. Boston, Brooklyn, Baltimore, Washington and Saint Louis followed in order. New York, as the largest city in America, has the greatest problems in connection with its water supply. The *Old Croton Aqueduct* has a total length of thirty-eight miles and an average fall of one foot per mile. For most of its length it is constructed of stone, brick and cement. The water is carried across the Harlem River in three iron pipes, the largest having a diameter of seven and one-half feet. It was designed to carry 72,000,000 gallons a day, but was soon found to be too small for the needs of the city. Minor changes were made from time to time to increase the flow, until in 1890 the *New Croton Aqueduct* was completed. The new one, like the old, begins at Croton Lake, an artificial body created by damming the Croton River, and runs to 135th Street, where it is connected with the city's distributing system. It passes the Harlem River by an inverted siphon 300 feet below the river bed. For most of its length it is a horseshoe-shaped tunnel thirteen and one-half feet high and an inch or two wider. Its original carrying capacity was over 300,000,000 gallons a day, but its average flow, because of wear on the interior, is now only 250,000,000 gallons.

Catskill Aqueduct. This great project, begun in 1906 and practically completed in 1913, will eventually add 500,000,000 gallons a day to New York's water supply. From its beginning in the Catskill Mountains to the end of the aqueduct proper is a distance of ninety-two miles, and pipe lines and branches in the city add thirty-four miles more. The water is taken from several rivers in the mountains and is collected and stored in the great Ashokan reservoir, thirteen miles west of Kingston, N. Y. The reservoir is twelve miles long by one mile wide, with a maximum depth of 190 feet. Two smaller reservoirs are respectively thirty and fifteen miles from the New York Municipal Building. The initial capacity of the system is 250,000,000 gallons a day, but by 1922, with the completion of several additional secondary reservoirs, this figure was doubled.

Most of the aqueduct was built by the "cut-and-cover" method; that is, excavations were made, the aqueduct was built in the opening, and the earth was then replaced. Fifty-five miles were constructed in this way, and thirty-

one miles were tunneled. One of the most remarkable features is the tunnel under the Hudson River, near West Point. It is 3,000 feet long, cut in bed rock 1,100 feet below the river's surface. On each shore is a shaft, lined with concrete, with an inside diameter of fourteen feet. The cost of the entire system, including about $25,000,000 for piping and local reservoirs in the city, was somewhat in excess of $200,000,000.

Los Angeles Aqueduct. This is the longest aqueduct in the world, with a length of 235 miles. It was begun in 1907 and was placed in operation in 1914. It diverts the entire flow of the Owens River, which it receives about ten miles north of Independence, Cal. As the elevation of the intake is 3,800 feet above the sea, and that of Los Angeles only 275 feet, the water flows to every part of the city by gravity. Besides supplying the city with an abundance of water, the aqueduct carries enough to irrigate thousands of acres of land nearby, and will ultimately furnish 120,000 horse-power for electric plants of the city. Nearly the whole of the aqueduct was built by the city itself, not by contractors, and its estimated cost was $25,000,000.

In Mining and Irrigation. The name aqueduct is sometimes applied to ditches and other channels used in mining and in irrigation. Occasionally these are permanent structures of stone or concrete, but more often they are temporary structures of wood and are properly called *flumes,* not aqueducts. Some irrigating systems require as much water as a fair-sized city, notably in the western part of Canada and the United States. For details, see IRRIGATION.

W. F. Z.

AQUINAS, *a kwi' nas,* SAINT THOMAS (1227-1274), a celebrated divine, called by his fellow-students at Cologne the "dumb ox," but years later by his pupils "the Angelic Doctor." He was a member of the Dominican Order, and taught at Cologne, Rome, Bologna and Pisa, showing such learning and piety that he was looked up to as one of the foremost churchmen of his time. His greatest work, the *Summa Theologiae,* is a "summing up" of the theological system of the Roman Catholic Church, and stands to-day as a standard authority. Aquinas was declared a saint by Pope John XXII in 1323.

ARABESQUE, *ar a besk',* a term meaning *after the Arab style,* employed in a narrow sense to describe a certain kind of fantastic ornamentation which the Arabs and Moors used on their buildings. More generally the word denotes any kind of ornamentation of a

ARABESQUE ORNAMENTATION

fanciful character. In the arabesques of the Mohammedans the figures of men and animals were never used, because the Koran forbade it, and architects and artists confined themselves to geometric devices, foliage, fruit, floral forms and the like, which were arranged in elaborate designs. The most beautiful Moorish arabesques are found in the Alhambra, Spain, and the best examples of Roman work in this same style are the works of Raphael in the Vatican, imitated from earlier friezes.

ARABIA, *a ra' bi a,* a great peninsula of Southwestern Asia, a land of romance, of deserts and unexplored waste, toward which the eyes of the world are turned chiefly because it is the home of one of the great religions, Mohammedanism. From it have come, however, in centuries past, the beginnings of so many of the arts and sciences that a history of education or of civilization cannot well omit Arabia.

ARABIA
Location marked in black.

The Land. Including the Syrian desert, Arabia has a greatest length of 1,500 miles, while its greatest breadth is 1,200 miles. From its northern to its southern boundary the distance is almost as great as from New York to Denver, and its total area, 1,200,000 square miles, is about one-third that of the United

States with Alaska and its island possessions included. In estimating its population authorities differ, some placing it as high at 7,500,000, others as low as 4,500,000. This difference is accounted for by the fact that in no part is there any regular census, while absolutely no definite information is to be had respecting a large part of the central desert regions.

Within the vast area of Arabia there are no such varieties of climate, soil and resources as are to be found within the United States. For while the surface is diversified into central tableland, surrounding deserts and ranges of mountains parallel to and approaching the coast, one condition prevails almost everywhere—extreme dryness. There are relatively small territories elsewhere on the earth's surface which are as dry, but nowhere else except in the Sahara is so large an arid stretch to be found. In mountain and in lowland, the date palm is often the only sign of vegetable life, and there are districts which in the course of a year do not have a single shower of rain. There are dried up river courses which show that once the country must have had abundant water, and in a few of them there are trickling streams during the so-called rainy season, but in all Arabia there is not one real river. Thousands of square miles in the interior are made up of deserts dryer than the Sahara, much of which have never been explored. The heat, too, is in many places intense, and Aden, in the southwestern part, is the hottest spot in the world. The reason for the extreme dryness and heat is that almost all the winds come from the northeast, across the hot, arid regions of central Asia.

In such a climate few things will grow except the date palm, which furnishes the staple article of food; but there are spots where figs, grapes and corn thrive in good years, and the province of Yemen, in the southwest, politically a part of Turkey, exports the excellent Mocha coffee. In the oases wild animal life is fairly abundant, ostriches, gazelles, jackals, hyenas and even lions being not uncommon. Of the domestic animals, the Arabian horses and camels are famous far and wide. The Arabian horses are among the most beautiful and high-spirited breeds in the world, but it is the camel upon which the Arab mainly depends—"ship of the desert," which alone makes it possible for him to travel across the drifted, sandy wastes.

The People. See article ARABS.

Government and Religion. Arabia is not a country in the sense in which the United States or Great Britain is, for the almost impassable deserts have prevented any unity of government. To-day the west coast and part of the east coast belong to Turkey; Aden, in the southwest corner, is a dependency of England; Oman is independent, though under English influence, while the central part is under the sway of a number of native sheiks or chiefs. Mecca, the holy place of the Mohammedans, is its chief city. Other important towns are Medina, Mocha, Aden and Muscat.

But though divided politically, religiously Arabia is a unit, for Mohammedanism everywhere prevails. To the Arab the greatest blessing on earth is to be able to make a pilgrimage to Mecca and so receive forgiveness for all his sins. The greatest happiness to be derived after death is to live forever in a green oasis where there is no lack of water or food.

History. The history of the Arab peoples previous to the time of Mohammed is obscure, but with his advent the Arabians united for the purpose of extending the new creed; and under the caliphs, the successors of Mohammed, they obtained great power and founded large kingdoms in three continents (see MOHAMMED; MOHAMMEDANISM).

On the fall of the caliphate of Bagdad in 1258 the decline set in, and when the Moors were driven from Spain in the fifteenth century, the foreign rule of the Arabs came to an end. In the sixteenth century Turkey subjected Hedjaz and Yemen and received the nominal submission of the tribes inhabiting the rest of Arabia. The subjection of Hedjaz has continued down to the present day, but Yemen became independent in the seventeenth century and remained so till 1871, when the territory again fell into the hands of the Turks. In 1839 Aden was occupied by the British. Oman early became virtually independent of the caliphs and grew into a well-organized kingdom. The Wahabis (which see) appeared toward the end of the eighteenth century and took an important part in the political affairs of Arabia, but their progress was interrupted by Mohammed Ali, pasha of Egypt, and they were completely defeated by Ibrahim Pasha. He extended his power over most of the country, but the events of 1840 in Syria compelled him to renounce all claims to Arabia. The Hedjaz thus again became subject to Turkish sway. Of recent years none but minor changes

OUTLINE AND QUESTIONS ON ARABIA

Outline

I. Position

(1) Latitude, 12° 40′ to about 35° north
(2) Longitude, 32° 30′ to 60° east

II. Size and Shape

(1) Length, 1,500 miles
(2) Breadth, 1,200 miles
(3) Area, 1,200,000 square miles
(4) Form, an oblong quadrilateral

III. Coast Waters and Shore Line

(1) Arabian Sea and Gulf of Aden on south
(2) Red Sea on west
(3) Mediterranean Sea on north
(4) Persian Gulf and Gulf of Oman on southeast
(5) Regular coast line

IV. Surface

(1) Deserts
(2) Central tableland diversified
(3) Mountain ranges surrounding tableland

V. Drainage

(1) Not one real river
(2) A few intermittent streams
(3) Dry river beds

VI. Climate

(1) Extreme dryness
(2) Intense heat
(3) Northeast winds

VII. Vegetation

(1) Little vegetation
(2) Few oases

VIII. Animal Life

(1) Wild animals
(2) Domestic animals
  (a) The Arabian horse
  (b) The camel

IX. Inhabitants

(1) Striking virtues
(2) General intelligence among men
(3) Women uneducated
(4) Nomadic life
(5) Transportation in Arabia

X. Government and Religion

(1) Divided politically
(2) Mohammedanism

XI. History

(1) Tribes united by Mohammedanism
(2) Decline of power
(3) Turkish conquests in Arabia
(4) The British in Arabia

Questions

What is the government of the country?

For what virtue have the Arabs been noted for over two thousand years?

Who are the Bedouins?

What did Shakespeare mean by "Arabian bird"?

Is there much illiteracy in Arabia?

How has the pilgrimage to Mecca been made easier?

What sort of vegetation grows in Arabia?

What is Arabia Felix?

What Arabian coffee is well known? From whom did the Arabians learn to drink coffee?

Have the Arabs ever had extensive political power?

Why has Arabia been so little coveted by outside nations?

What have we learned from the Arabs?

How does the area of Arabia compare with the combined areas of Ontario and Quebec?

For what two animals is Arabia especially famous?

and happenings have occurred in the history of the peninsula. So much of the territory is practically worthless that there has never been the fierce contention over it that there is over more favored spots.

Other Items of Interest. Arabia was the first country outside of Abyssinia to adopt coffee drinking.

During the War of the Nations in 1915, Arabia, under the leadership of the Shereef of Mecca, declared its independence of Turkey. There had been ill feeling ever since the coming into power of the Young Turks, who attempted to supplant the Arabian language by their own.

The sacred pilgrimage to the tomb of Mohammed at Medina is easier than ever before, for a railroad has been built from Damascus to Medina. The line was to be continued to Mecca, but the rails which were intended for this part are said to have been used during the War of the Nations on a Turkish railroad of greater strategic importance.

The southwestern corner of the country is known as *Arabia Felix,* which is Latin for *Fortunate Arabia.* Behind it rise mountains to a height of perhaps 8,000 feet, cutting off from the interior the rain-laden winds which give Arabia Felix ample rainfall during the whole summer.

Agrippa, in Shakespeare's *Antony and Cleopatra,* exclaims:

"O Antony! O thou Arabian bird!"

By Arabian bird he means the phoenix (which see).

Herodotus wrote, in the fifth century B.C.: "The Arabs keep pledges more religiously than almost any other people." This virtue has been noted by travelers in all times, including the present day.

Herodotus is also responsible for the statement that in Arabia there were sheep whose tails were three cubits (about five feet) long, so that all the shepherds made little trucks and fastened one to each tail, to prevent it trailing on the ground.

The prefix *al-* in an English word frequently shows that it is of Arabian origin, for *al,* like the Italian *il* and the Spanish *el,* means *the.* We find it in many familiar proper names, like Allan, Aladdin, Algeria; in names of Arabian sciences like algebra and alchemy; in alcove, alfalfa and alkali; in the names of stars, as Aldebaran and Algol; and in a large number of Spanish words, such as Alcazar and Alhambra.

If we did not have Arabic numbers arithmetic would be very difficult for us. O.B.

ARA'BIAN NIGHTS, or **THE THOUSAND AND ONE NIGHTS,** one of the most famous collections of stories in the world, loved by children for the charm and wonder of the old tales, and consulted by scholars for their pictures of the customs and manners of the Orient. It is supposed that the stories had their origin in India, that Persia adopted them, and that it was from the latter country that the Arabs received them. To-day they are printed in many languages—probably more than any other book except the Bible. It was early in the eighteenth century that they were introduced into Europe.

There are over two hundred tales in the complete editions of the *Arabian Nights,* and these are woven into one story by the following device:

According to the first story, the Sultan Shahriyar has made a law that every one of his future wives is to be put to death the morning after her marriage, and one beautiful girl after another has met that cruel fate. At length Shahrazad, the daughter of the grand vizier, offers to become the sultan's bride, but begs her sister to visit her on the morning after her wedding and request that she be allowed to tell one last story before she dies. The scheme is carried out, the request is granted, and the sultan becomes so interested in the tale that he declares she must live until he has heard the end of it. Thus by breaking off each night in the middle of a thrilling narrative she keeps the sultan interested and saves her own life; for by the time she has entertained him for one thousand nights he has fallen in love with her and decided that she is as good as she is clever.

So well known are some of these stories that people anywhere will understand references to Aladdin, to Ali Baba and the Forty Thieves, to the Old Man of the Sea, or to the Magnetic Mountain which drew the nails out of the ship that came near it.

ARA'BIAN SEA, the part of the Indian Ocean between Arabia, India and Beloochistan, north of a line drawn from Cape Comorin at the southern extremity of India to Cape Guardafui on the east coast of Africa. The Red Sea and the shallow Persian Gulf are properly arms of the Arabian Sea. In ancient times the Arabian Sea was of great importance as a commercial route, goods from the Far East being brought by ship to its shores and

carried by caravans to the Mediterranean. The opening of the Suez Canal in 1869 raised the value of the sea as a highway, but caused the caravan routes to be abandoned.

The most important islands in this sea are the Laccadives, off the west coast of India, and Sokotra, northeast of Cape Guardafui. On the east it receives the waters of the great River Indus and indents the Indian coast with the gulfs of Cutch and Cambay. See map, article Asia.

ARABIC, *ar' a bik,* **NUMERALS,** the common figures used in writing numbers to-day, but which have been employed among Europeans only since the twelfth century. Before that, letters were employed, as in the so-called

OLD ARABIC NUMERALS

Roman numerals which are I, V, X, L, C, D, M. When the Moors established themselves in Spain the Christians looked upon them with the most intense disfavor and had no dealings with them save to fight them in war, but they were forced to admit that in some ways the Moors possessed the superior skill. Especially did they know how to calculate.

At length one young Christian scholar, desiring knowledge more than he hated the Moors, disguised himself and went to one of their schools, where he learned the wonderful art of calculating, which is to-day called *arithmetic.* He learned, too, to make certain new symbols which proved so very useful that they speedily spread over all civilized Europe. These were the Arabic numerals, 1, 2, 3, etc. That the Arabs did not invent these figures is now regarded as certain, and it seems probable that they acquired them from India; but research has failed to show the real beginning of the figures which play so large a part in the records and the business of the world. See Arithmetic; Roman Numerals.

ARABS. This name is given to the inhabitants of Arabia and the neighboring lands. The Arabs are of interest not only because they have preserved in much greater degree than most peoples the purity of their original stock, but because they rank unusually high among the races of mankind. Europeans and Americans are somewhat inclined to look upon the Arabs as an inferior race, and it comes as a surprise to learn that authorities regard them as the most perfect race physically and as one of the most highly endowed mentally.

Characteristics. They are tall and of proportions that an athlete might envy, and the black eyes set above their aquiline noses shine with intelligence. The Arabs of Arabia are always very clean, the Koran making frequent bathing obligatory, but those of Africa often keep the letter but not the spirit of this command by bathing in sand instead of water.

Though they have lost that remarkable aptitude for science which was responsible for the birth of chemistry and astronomy and the great advancement of geography and mathematics, the Arabs still put a high value on education. Few indeed are the men and boys, even of the desert tribes, who cannot read and write, but like all Mohammedans, they consider that a woman has no need of education.

Morally, the Arab leaves much to be desired. While he is unusually hospitable, will stand by his pledged word even to death, and never forgets a favor, yet he does not forget an injury, and his vengeful spirit makes the repaying of it the chief work of his life. If a member of his family has been killed the Arab may not rest until he has put to death the slayer. Then, too, an Arab, especially one of the wanderers, or nomads, appears to have no idea of property rights.

Manner of Life. All the Arabs do not live in Arabia. The crusading zeal of Mohammedanism led them into all the neighboring countries, and North Africa they have made distinctly their own. Their civilization there is much as it is in Arabia. The town-dwellers have for the most part remained true to the architectural forms evolved by their Arabian ancestors; the desert wanderers hold to the same primitive customs as their brothers in Arabia. In the accompanying picture the interior shown is that of a North African house, but it might be the dwelling of a wealthy family in Mecca.

The traveler approaching an Arab town sees one characteristic thing—the inevitable surrounding wall. Usually it would be of no use as a defense, for it is made of dried mud, but custom has decreed that it shall be there. Many of the houses are of sun-dried bricks, though the poorer people cannot afford even this luxury, and must content themselves with shelters of woven branches or homes of rude tents. Fortunately most of the lands in which the Arabs live are very dry, otherwise every

ARAB TYPES

(*a*) North African, in joyous mood.
(*b*) Arab woman, with face covered, according to centuries-old custom.
(*c*) Nomadic, or wandering, Arabs, and the only home they know.
(*d*) Interior of Arab house, North Africa.

village and town would be a breeding-place for disease, as no attention is paid to drainage.

Nomads. Perhaps the most interesting of the Arabs are the nomads, or wanderers. These Bedouins, as they are called, are full-blooded Arabs, who live not in town but in tents on the edges of the deserts and in the oases. With their herds of camels they roam from place to place, following the same course year after year unless a scarcity of grass for their camels compels them to go elsewhere. They live on the milk from the camels and the cheese made from it, together with such dates and bread as may be obtained by barter. When the season is especially dry the camels starve, particularly the young ones, and there is not enough milk to keep the men, women and children from suffering. Then it is that the Bedouins rob and plunder.

Caravans. Fear of these desert robbers is one reason why the merchants of Arabia travel in caravans rather than singly. With their trains of laden camels they cross the deserts over trails that to unaccustomed eyes would be invisible. This method of travel dates back with little change to centuries before the Christian Era, for the Arabs have made slight advance in customs. O.B.

ARACHNE, *a rak' ne,* according to Greek legend, a girl who was so proud of her ability to weave that she dared to match her skill with that of the great goddess Athene, or Minerva. For her presumption Athene changed her into a spider, that she might spend her life in spinning. See MYTHOLOGY, for story.

The closeness of the connection between this myth and nature is shown by the fact that the spider in Greek was *arachne.* And when scientists were seeking a general name which should include all spiders, as well as the mites and scorpions, they used this word as a basis, calling the whole class of animals *arachnida.*

ARACHNIDA, *a rak' ni da,* a class of animals belonging to the subkingdom *arthropoda* (which see), represented by the spiders, scorpions, mites and ticks. Animals of this class differ from insects in that the head and thorax are generally united and the thorax usually bears four pairs of legs (see INSECTS). Feelers, or antennae, characteristic of insects, are also lacking. Arachnids have simple eyes varying in number from two to twelve. Species of spiders are known by the number and arrangement of these eyes. Breathing is carried on by means of tracheae or by "lung-books," these latter consisting of sacs contain-

ing several blood-filled leaflike plates, opening on the under side of the abdomen. Nearly all arachnids live on animal matter, and many of them are parasites. The mites, however, live on plant sap. As the animal-feeders usually prey upon insects, they are of benefit to the farmers. The word *arachnida* is of Greek derivation, and the name Arachne appears in Greek mythology; in the legend it is borne by a Lydian girl who was changed into a spider because she equalled Athene in spinning.

Related Subjects. The following articles will give a detailed discussion of the characteristics of the most important arachnids:

Daddy-long-legs	Spider
Mites	Tarantula
Scorpion	Ticks
Sheep Tick	Trapdoor Spider

ARAGO, *ah' ra go,* DOMINIQUE FRANCOIS (1786-1853), a celebrated French astronomer and statesman who made such great personal sacrifices in behalf of science that the Paris Academy of Sciences broke one of its standing rules and elected him, though too young for that honor, to be one of its members. In 1806, while in the Pyrenees Mountains working on the measurement of an arc of the meridian for the French government, he was captured by the Spanish as a spy, and succeeded in reaching his native country only after going through much hardship and suffering many narrow escapes. He became life secretary of the Academy of Sciences in 1830, and his work as a scientist included several important discoveries in electro-magnetism. He also held a number of public offices, and was known as the champion of the people's rights. Arago wrote about sixty scientific works.

ARAL *air' al,* a large salt-water lake in Asia, in Russian territory, about 150 miles west of the Caspian Sea. Because of its isolation and the character of the surrounding country it has been of little value to the world. It covers an area of 26,000 square miles, and is therefore a little larger than the state of West Virginia and more than twice as large as Belgium. It is fed by the waters of the Amu-Darya or Oxus, and the Syr-Darya or Jaxartes rivers. The lake contains an abundance of sturgeon and other fish, and has a large number of islands. Navigation on it is difficult because of the shallowness of the waters and the fierce and sudden storms from the northeast. For location on map, see ASIA.

ARAMAIC, *ar a may' ic,* an ancient language closely allied to the Hebrew. Its relations are explained under the title HEBREW LANGUAGE AND LITERATURE.

ARAPAHO, *a rap' a ho,* an Algonquian tribe of American Indians, whom the Cheyenne call "Blue-sky men" or "Cloud men." This was formerly a large tribe, but now they number only about 1,800. They are a brave, kindly and accommodating people, much given to observing ceremonies. Before they were known to white men the Arapaho were supposed to have lived in the valley of the Red River of the North, in Minnesota, later they moved westward into Wyoming and subsequently a part of them were placed on a reservation with the related Cheyenne in Oklahoma, where they are now farmers. Those in Wyoming are still on a reservation. See INDIANS, AMERICAN.

ARARAT, *air' a rat,* a celebrated mountain of Armenia, in Western Asia, on which Noah's ark is supposed to have rested when the waters of the Deluge subsided. It is a volcano of two cones, the highest being 17,260 feet above the sea. The last eruption occurred in 1840 and caused great destruction of life and property. The summit of the mountain is in Russian territory.

Another Mount Ararat, or Pilot Mountain, is found in Surrey County, N. C. This mountain is 3,000 feet high, and can be seen from a long distance.

ARBELA, *ar be' la,* an ancient town in Assyria, which gave its name to the battle fought in 331 B.C., in which Alexander the Great overcame the Persian king Darius, and thus made possible the spread of Greek civilization over Western Asia. This battle, one of the fifteen decisive battles of history, was actually fought at Gaugamela, about twenty miles from Arbela. On the site of the ancient city is the modern town of *Arbil,* in the Turkish province of Mosul. See FIFTEEN DECISIVE BATTLES OF THE WORLD.

ARBITRATION, a peacable, semi-judicial method of settling disputes between individuals or nations. The word is derived from the Latin *arbitratio,* meaning an *examination* or *judgment.* The essential principle in arbitration is that the examination is made by impartial umpires, who also render the final judgment. A board of arbitration may, and usually does, include representatives of the parties to the dispute, but it is customary to include one or more neutral persons whose interests are not affected by the case.

A fundamental difference must be noted be-

tween arbitration involving individuals and that involving nations. Arbitration by individuals has been made compulsory in many parts of the world, particularly in labor disputes. The most conspicuous example is in New Zealand, where strikes and other problems of labor must be arbitrated, and failure to carry out the award of the arbitrators is punishable by law. Arbitration between nations is purely voluntary, and no international power, except war or the threat of war, exists to force a nation to accept an award which it regards as unjust.

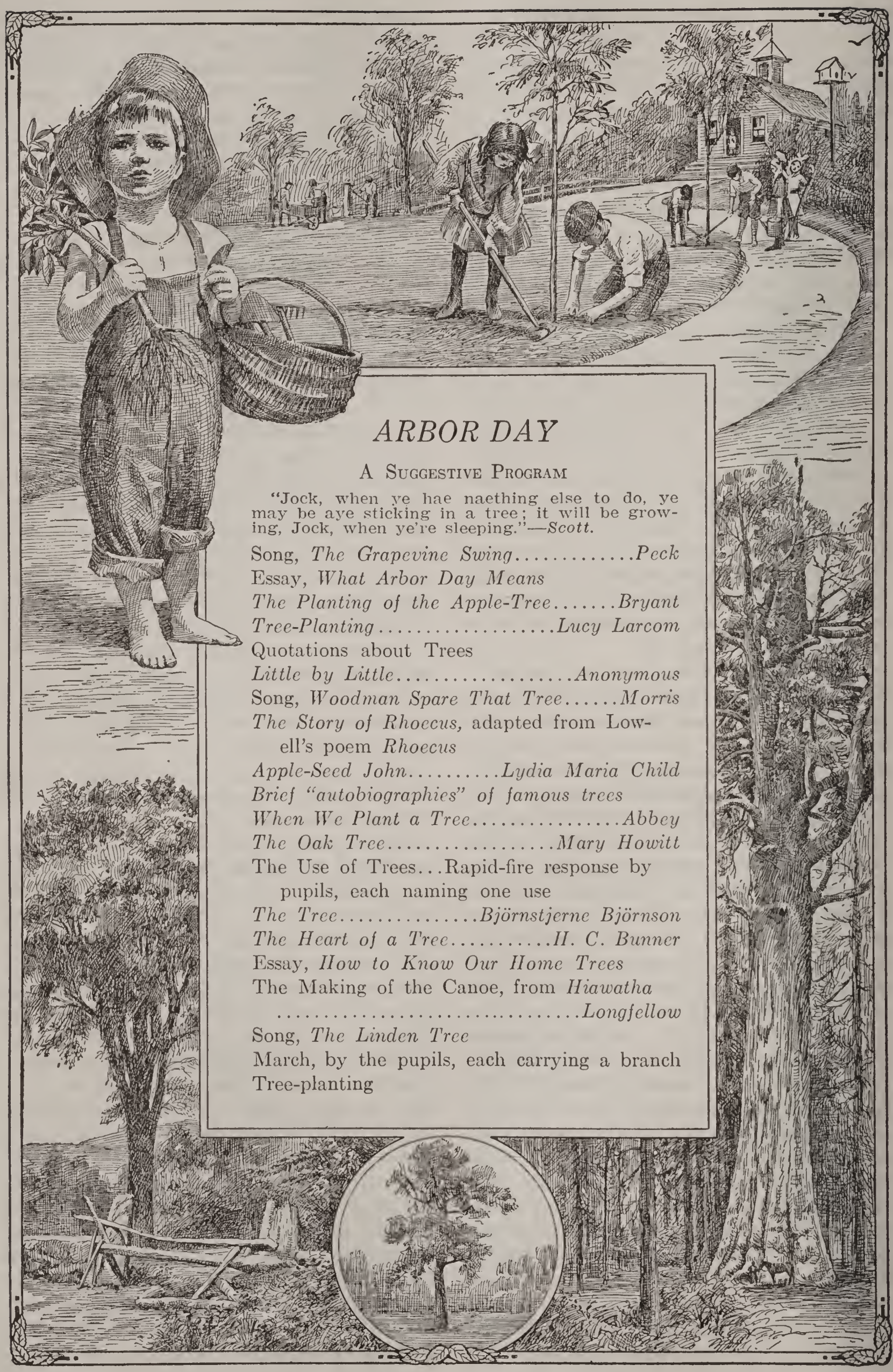
In Civil Cases. Arbitration is a simple method of settling many cases without the delay and expense of a long legal process. It is especially desirable if the amount at issue is small, when the court costs and other fees would be greater than the money or value of property involved. In Pennsylvania arbitration is compulsory if one of the parties desires it, although in most states it is voluntary. In England, arbitration may be at the request of the parties concerned, or at the order of the judge, who appoints a referee; in either case the awards are usually enforced by the courts unless fraud can be proved.

Industrial Arbitration. As a method of settling disputes between employers and employees, arbitration is increasing in popularity, especially in those industries on which the general public is dependent for its comfort or security. An example of this tendency was the settlement of the great strike of the anthracite coal miners in the United States in 1902; arbitration in this instance was due to the initiative of President Roosevelt. Another miners' strike, perhaps of even greater importance and settled in the same way, was the refusal of the Welsh coal miners in 1915 to work until their wages were increased and their working conditions improved. Strikes of employees of steam, electric and street railways are frequently settled in this way. In New Zealand and several states of Australia compulsory arbitration is enforced, but this method has made slow progress in other parts of the world. New York, Massachusetts and a few other states have boards of arbitration which may investigate disputes on their own initiative or at the request of one of the parties. In Canada the Dominion Department of Labor frequently settles labor disputes.

International Arbitration. From ancient times to the present many disputes between nations have been settled by arbitration. The Greeks and Romans, to be sure, regarded foreigners as barbarians, and generally refused to consider arbitration with another nation, but between the various Greek states it was a common occurrence. In more modern times the Pope has been chosen frequently as arbitrator—for example, when Pope Alexander VI drew the line of demarcation between Spanish and Portuguese possessions in the two Americas, and when Pope Clement XI was the third arbitrator under the terms of the Treaty of Ryswick (see DEMARCATION, LINE OF). In the nineteenth century Great Britain and the United States have several times arbitrated their disputes (see ALABAMA, THE; BERING SEA CONTROVERSY; BRITISH COLUMBIA, subhead *History*). Perhaps the greatest step in the effort to eliminate war as the result of disputes was the establishment of the Hague Tribunal, a permanent international court. Many nations have signed individual arbitration treaties with other nations. The United States, through Secretary of State Bryan, proposed and ratified in 1914 a series of such treaties with most of the leading nations of the world. These all provide for the creation of commissions to which disputes may be referred, and the parties to the treaties agree not to declare war before the report of the commission is presented. See PEACE CONFERENCE, INTERNATIONAL. W. F. Z.

Consult Foster's *Arbitration and The Hague Court;* Morris's *International Arbitration and Procedure.*

ARBOR DAY, a day set apart in Canada and the United States for the planting of trees, honored most of all by the children of the public schools. It is a part of the movement which has for its aim the saving and renewal of the forests and other natural resources of these countries (see CONSERVATION). The first Arbor Day was celebrated in Nebraska in 1872, and was the idea of Julius Sterling Morton, Secretary of Agriculture under President Cleveland. Mr. Morton deplored the fact that his state should be almost treeless, and that in other parts of the country there had been such widespread destruction of timber areas. Since that time other states and a number of provinces have one by one adopted the plan which he developed, and now a large proportion of them have an Arbor Day, either fixed by law or named by proclamation. In Canada and in most of the northern states it comes late in April or early in May; in the southern states, between December and March,



ARBOR DAY

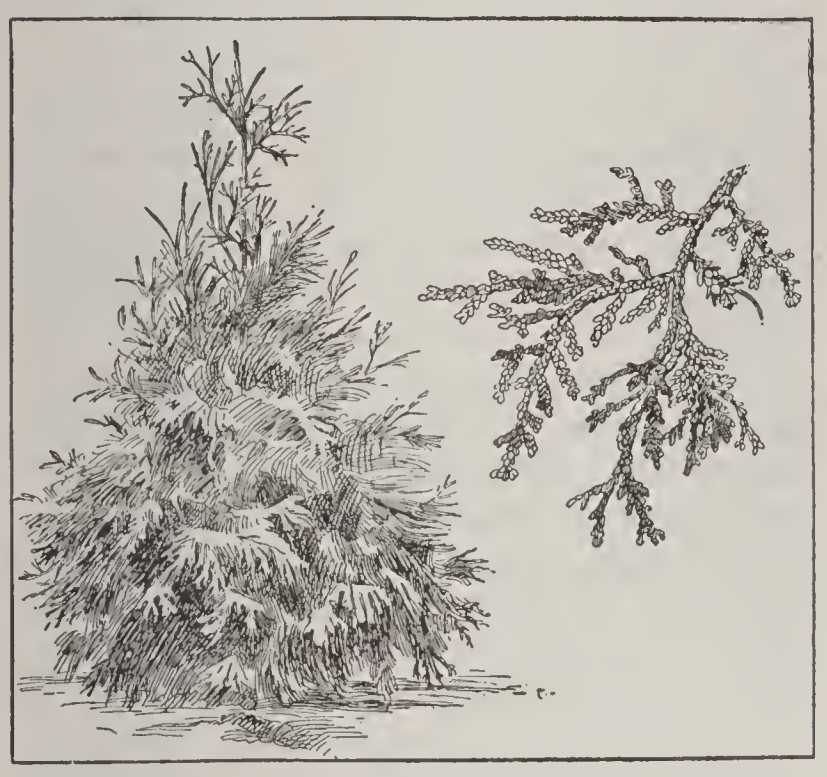
A Suggestive Program

"Jock, when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping."—*Scott.*

Song, *The Grapevine Swing*.....*Peck*
Essay, *What Arbor Day Means*
The Planting of the Apple-Tree.....*Bryant*
Tree-Planting.....*Lucy Larcom*
Quotations about Trees
Little by Little.....*Anonymous*
Song, *Woodman Spare That Tree*.....*Morris*
The Story of Rhoecus, adapted from Lowell's poem *Rhoecus*
Apple-Seed John.....*Lydia Maria Child*
Brief "autobiographies" of famous trees
When We Plant a Tree.....*Abbey*
The Oak Tree.....*Mary Howitt*
The Use of Trees...Rapid-fire response by pupils, each naming one use
The Tree.....*Björnstjerne Björnson*
The Heart of a Tree.....*H. C. Bunner*
Essay, *How to Know Our Home Trees*
The Making of the Canoe, from *Hiawatha*
.....*Longfellow*
Song, *The Linden Tree*
March, by the pupils, each carrying a branch
Tree-planting

The school children observe the day by planting trees on the school grounds and taking part in exercises, consisting of songs and recitations, that help them to remember the beauty and importance of Arbor Day. The government departments of agriculture publish Arbor Day manuals with helpful suggestions for observing the day, which will be sent to anyone who writes for them, and several of the states and provinces also issue valuable manuals. A typical program is given herewith.

ARBOR VITAE, *ar' bor vi' tee,* a name which means *tree of life.* It is given to certain cone-bearing trees because they are of the evergreen variety and because their resin was once supposed to be very valuable as a



ARBOR VITAE

Appearance of tree and detail of branch.

medicine. Arbor vitae trees are much like cypresses and have flattened branchlets with small, scale-like leaves overlapping like the shingles on a roof. The common arbor vitae is a native of North America, where it grows to a height of forty or fifty feet. The young twigs have a pleasant, spicy smell.

ARBUTUS, *ahr bu' tus,* the name given to a number of evergreen plants of the heath family, most of which are shrubs or tall trees, though some are tiny and inconspicuous. In Eastern and Central Canada and the United States the best-known species is the *trailing arbutus,* a creeping plant with shining, evergreen leaves and dainty white or pink flowers, which have a delicious fragrance. It is one of the earliest spring wild flowers, and one of the best-loved. The ornamental *strawberry tree* and the picturesque *madroña* of California, with its red bark and glossy leaves, also belong to the arbutus group.

TRAILING ARBUTUS

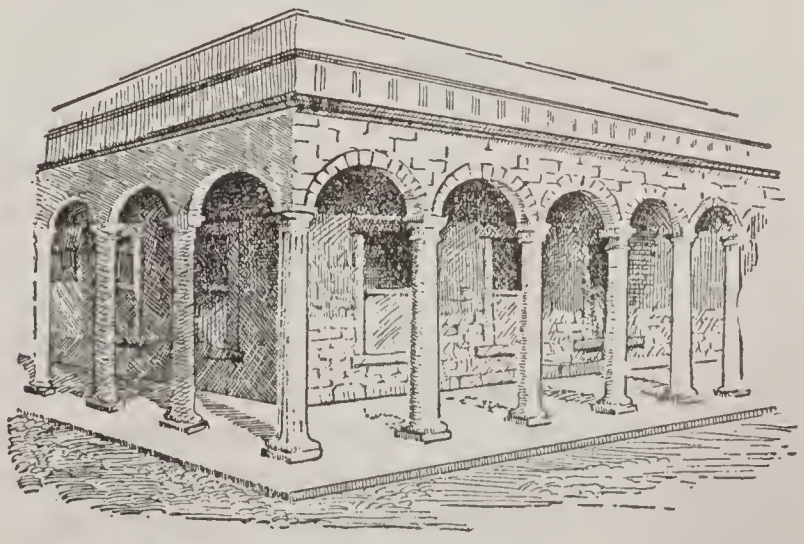
Darlings of the forest!
  Blossoming alone
When Earth's grief is sorest
  For her jewels gone—
Ere the last snow-drift melts
  Your tender buds have blown.

—*Cooke.*

ARCADE, from the Latin word for *bow,* is the name given to a series of arches supported by columns or piers. As a rule there is a passageway or promenade behind the arcade, as in the case of the cloisters in the old monasteries where the monks used to gather for recreation and exercise. Such an arcade was what the poet Milton had in mind when he wrote of—

A pillar's shade,
High over-arch'd, and echoing walks between.

Often, however, the wall is built up close to the columns, so that the arcade is in reality only a decorative screen. This form is known variously as a *blind arcade, wall arcade,* or *arcature.* Arcades are also used in the interiors of churches for ornamental railings and similar purposes.



ARCADE

A Spanish style adopted by the Moors

The arcade was first used by the Romans and appears frequently in their aqueducts, palaces and theaters. The great Colosseum at

Rome has three arcades, one over the other; in the famous Palace of the Doges at Venice both the lower and second stories are arcaded, as is also the interior court (see COLOSSEUM; DOGE). The arcade was a favorite form of the Saracens. It appears in their mosques in Cairo and when the Moors came to Spain they introduced it into their building there. Among the most beautiful arcades in all architecture are those which, resting on white marble pillars, surround the Court of the Lions in the Alhambra at Granada, Spain (see ALHAMBRA).

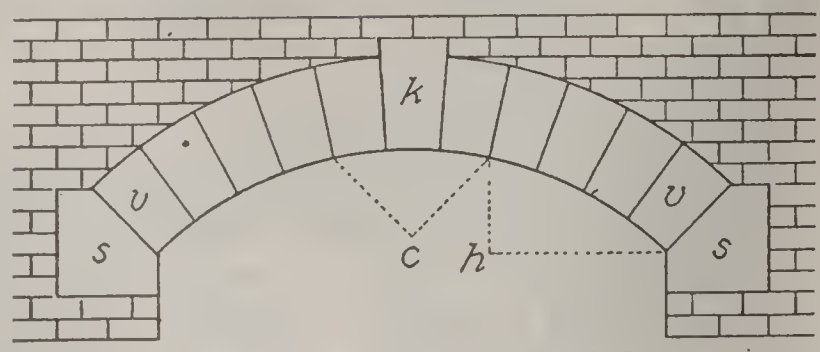
ARCADIA, in ancient Greece, the central and most mountainous part of the Peloponnesus, whose inhabitants were largely a shepherd people. They were famed throughout Greece for the simplicity and innocence of

ARCADIA (IN BLACK)
Surrounding provinces were as folows:

(*a*) Elis
(*b*) Achaea
(*c*) Argolis
(*d*) Messenia
(*e*) Laconia
(*f*) Acarnania
(*g*) Aetolia
(*h*) Aeniania
(*i*) Locris
(*j*) Doris
(*k*) Oetaea
(*l*) Malis
(*m*) Phocis
(*n*) Boeotia
(*o*) Megaris
(*p*) Attica
(*q*) Euboea

their character and manners, and for that reason the name *Arcadia* came to be used worldwide as a symbol of rural simplicity and happiness. In every country, especially at times when life has been most complex and artificial, poets and prose writers have delighted to write tales of a fanciful Arcadia, where charming shepherdesses and brave shepherds spent their life in unbroken peace and happiness. Of these romances the *Arcadia* of Sir Philip Sidney is perhaps the most famous.

ARCH, an architectural form that combines grace and beauty with strength and utility. It has no support on the sides or top, but by reason of the perfect balance of its parts is able to bear the weight of a load over an open space, as in doorways, windows, roofs, bridges or tunnels. Arches are made of stone,



DETAILS OF THE ARCH
The various parts are described in the text.

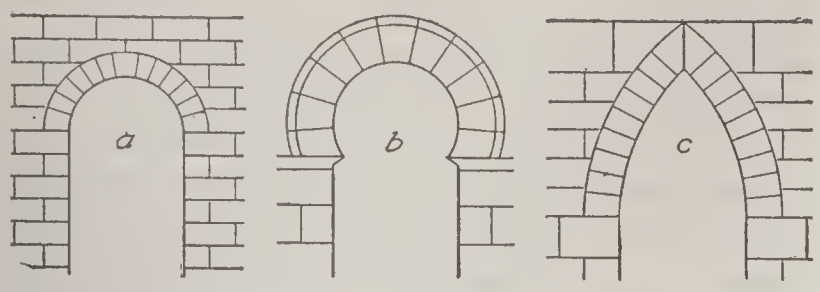
brick, wood and steel, but the wooden arch is little used in building at the present time. The most common form of the arch is that of a bow, but some arches are pointed, and there are a great many modifications of both the round and the pointed arch. The illustration shows the various parts.

The typical arch is composed of wedge-shaped pieces, called *voussoirs, ring-stones* or *arch-stones,* the middle stone being the *key-stone* and the lowest stone on either side the *skewbac,* or *springer.* The highest part is called the *crown;* the sides, *haunches;* the curve on the inner side, the *intrados;* the outer curve, the *extrados.* The base which supports the lowest stone on each side is the impost; in the illustration it consists of bricks. The distance between the two supports of an arch at its lower part is its *span;* the *rise* is the height from the bottom of the haunches to the under side of the keystone.

A single stone, called a *lintel,* constituted the oldest and simplest device employed in supporting a structure over a doorway. The ancient Egyptians, Assyrians, Etruscans and Greeks found the lintel practically sufficient for their needs; though they understood the principle of the arch, only the Etruscans used it to any extent. Among the Romans, however, it met with great favor and was developed to a high type of usefulness, appearing in their buildings, drains, aqueducts and bridges. The opening of the Cloaca Maxima, or Great Sewer, is still seen at Rome, and is supposed to be the oldest Roman arch, having been built about 500 B.C. The curved arch maintained its popularity until the Middle Ages, when the pointed or Gothic form came into use.

The Cabin John Bridge, near Washington, D. C., is the longest stone span in the United States; it is 220 feet long and twenty feet wide, and has a rise of fifty-seven feet. The largest stone arch ever made is at Plauen, Germany;

its span is over 295 feet. Steel arches are widely used at the present time in bridge



THREE TYPES OF ARCH
(*a*) Semi-circular. (*b*) Horseshoe. (*c*) Lancet.

building; the steel arch supporting the carriage bridge below Niagara Falls has a span of 840 feet, and the arch of the new Hell Gate bridge one of 1,016 feet (see HELL GATE).

Arches for purposes of decoration are also frequently seen. In public celebrations flower-covered arches often span the streets; single arches are sometimes erected for gateways or as memorials. The *triumphal* arch of the Romans, under which a victorious general led his army, is of historic fame. See ARCH OF TRIUMPH; CONSTANTINE, ARCH OF; SEPTIMIUS SEVERUS, ARCH OF; TITUS, ARCH OF; TRAJAN, ARCH OF. B.M.W.

ARCHAEOLOGY, *ahr ke ol' o jy,* the science which deals with the history of nations and peoples, not as set forth in their written records, but as shown in the material results of their labor which yet remain. Thus architecture, sculpture, painting, as well as the crudest of utensils and implements, furnish knowledge of what different peoples were in the early epochs of their history. The remains of Greek and Roman civilization have been given by far the most attention, and that branch of archaeology is therefore more advanced than others, but within the last few decades increasing interest has been shown in excavations and discoveries in Babylonia and other lands of the Near East. In the United States the Mound-Builders and some of the early Indian tribes left relics which have attracted much attention from archaeologists.

Archaeology divides the prehistoric period of the human race, especially as shown by remains found in Europe, into the Stone, the Bronze and the Iron ages, according to the chief material used for weapons and implements during each period. See AGE; MOUND-BUILDERS; BABYLONIA.

ARCHANGEL, *ahrk' ane jel,* a name meaning *chief angel.* As used in the New Testament the word indicates that there are ranks among the angels. Saint Paul refers to the Lord as an archangel (*I Thes.* IV, 13). *Jude* refers to the archangel Michael. While Gabriel is nowhere directly called an archangel he is considered chief among the angels. In *Revelation* there are various references which indicate that there are angels of different rank. See ANGEL.

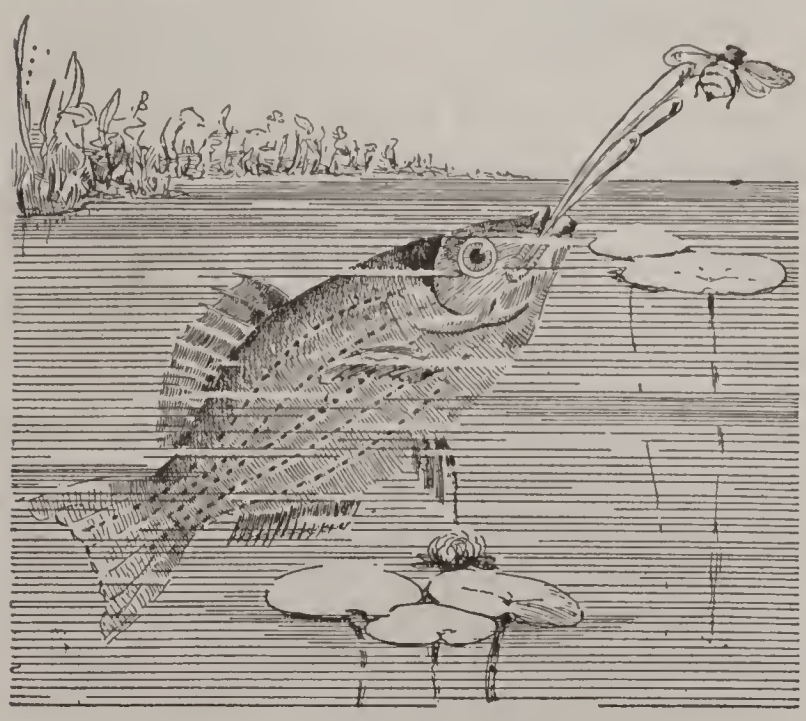
ARCHANGEL, an important Russian seaport and commercial center, founded in 1584, and situated at the mouth of the River Dvina on the White Sea, about 740 miles northeast of Petrograd. It is larger than any other town in the world in such northerly latitude, being less than 2° south of the Arctic Circle. If New York City were as far north as Archangel it would be located in Southern Greenland. For more than six months of the year the port of Archangel is closed by ice. Up to 1916 it was Russia's only open seaport in Europe, for its ports on the Baltic are not available for commerce in time of war because the nation which can control the narrow entrances around Denmark can effectively cut off that sea from the world. This occurred the day the War of the Nations was begun in 1914; then the importance of Archangel was emphasized as it had not been before for a hundred years. For description of Russia's new port, open all the year, see EKATERINA.

The trade of the city is extensive; it exports linseed, flax, tow, tallow, train oil, mats, timber, pitch and tar to the value of about $4,500,000 annually. In September each year a fair is held which attracts merchants from all parts of Russia and the East. The city contains some fine buildings and the cathedral is considered one of the finest in Russia. Population before the 1917 revolution, about 42,500.

ARCHBISH'OP, the chief prelate or bishop of an ecclesiastical province, or *see,* who has jurisdiction over all bishops in that province. The title was first used in the fourth century, to distinguish the bishops in large cities from those of smaller churches, and the office is recognized in the Roman Catholic, Anglican and Greek churches. The archbishop of Rome is the Pope; he has the power to appoint other archbishops, who must previously have been bishops. England has two archbishops, one at Canterbury and the other at York, of whom the former is supreme. His is the right of crowning the kings or queens of Great Britain. The Roman Catholic is the only Church maintaining the office of archbishop in the United States, which is divided into fourteen provinces, or sees, with an archbishop over each. See BISHOP.

ARCHEAN, *ahr ke' an,* **SYSTEM.** The word *archean* means *very ancient,* and the term Archean System is given to the rock formations of the oldest period of geologic time. The article GEOLOGY (which see) tells the story of the formation of the earth. In this account, geologic time, which is thousands upon thousands of years old, is divided into eras and periods; the Archeozoic is the first era, and its system of rocks is the Archean. The rocks of this system extend down to unknown depths, for they constitute the first series laid down in geologic history. They include igneous rock for the most part, such as granite, basalt and gneiss (see IGNEOUS ROCKS), but there are also deposits of sedimentary rocks, such as black carbon-bearing slates and limestones. These latter indicate the presence of life in that remote era, for such rocks are formed through the agency of plants and animals. There are, however, no fossils of any kind, and so geologists have no means of knowing what sort of life existed when the earth was in its infancy.

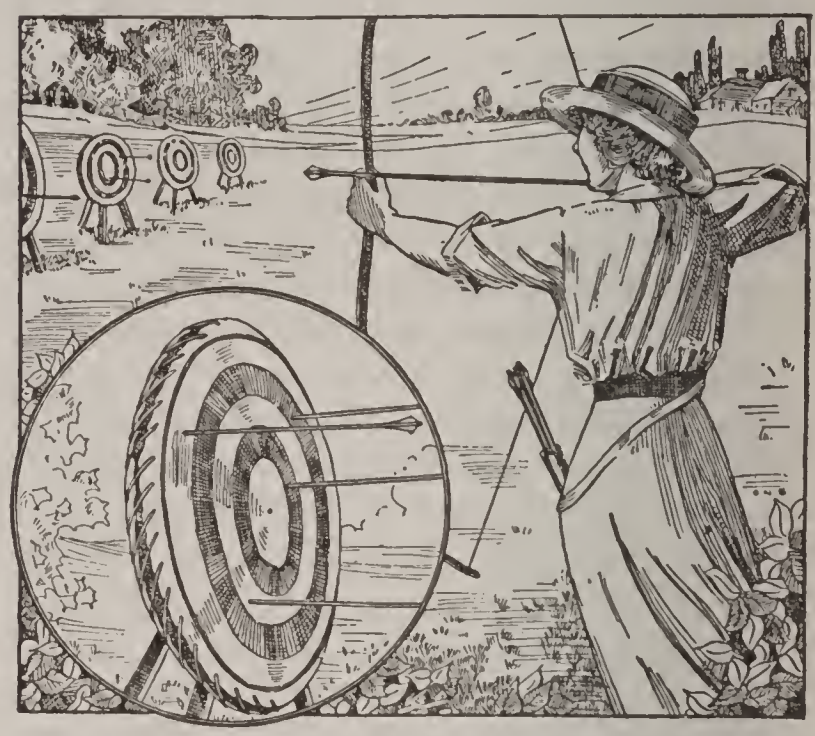
The Archean System underlies practically the whole surface of the globe. In North America an area of Archean rock occupies nearly the whole of the peninsula of Labrador, and stretches from that region in a southwesterly direction to the Great Lakes, thence northwesterly to the Arctic Ocean. There are other important areas in the eastern part of the United States and in the Rocky Mountains. In Europe Archean formations are prominent in the Scandinavian Peninsula, France, Germany and Spain, and there are similar formations in India, Northern China, Australia and New Zealand.



ARCHER FISH

ARCHER-FISH, a fish which gets its name from the peculiar way in which it catches the insects on which it feeds. It is said that it is able to shoot drops of water at insects a distance of three or four feet, and to bring them in this way into the water within its reach. The archer-fish is about six inches long, and is found in the seas around the East Indies.

ARCHERY, *ar' cher i,* practised in ancient times by the hunter and the warrior, is at the present time a healthful outdoor sport. The weapons of the archer are the bow and arrow. The history of archery is as old as the story



ARCHERY

The target of the best type is made of cork, with cloth covering. The latter may be frequently renewed.

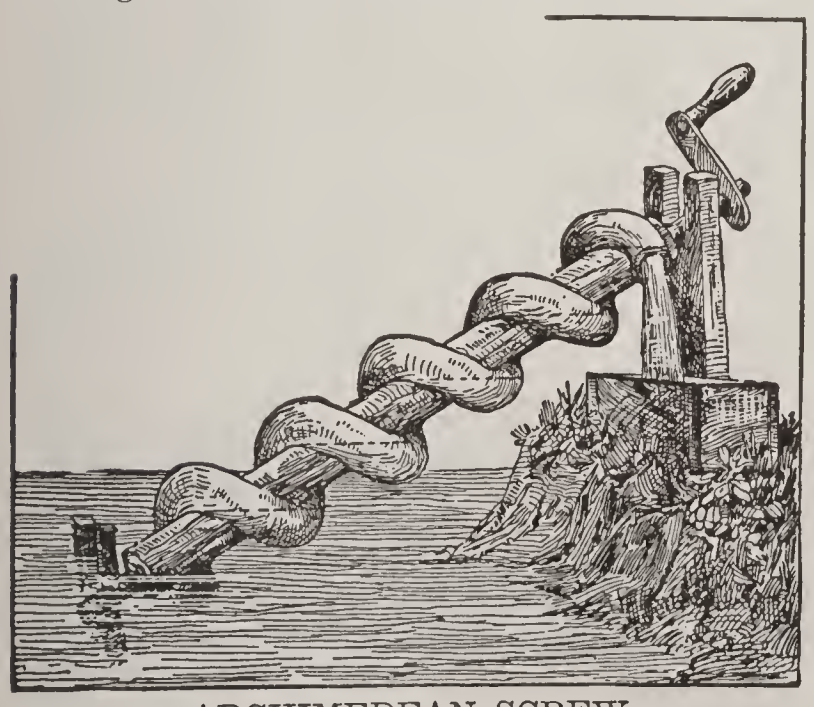
of mankind. One of the earliest Bible narratives is that of Ishmael, who "dwelt in the wilderness of Paran and became an archer" (*Genesis,* XXI, 20). The Egyptians, Persians, Assyrians, and Parthians were all highly skilled in the use of the bow and arrow, the Parthians being the most celebrated horse-archers of ancient times. Among European peoples none excelled the English in archery, and stories of the bow and arrow are numerous in their history, their legends and their songs. It is told that the Norman archers of William the Conqueror broke up the ranks of the English at the Battle of Hastings, by shooting upward showers of arrows that fell upon the faces of their enemy; but later the skill of the English archers won on French soil the famous victories of the Hundred Years' War—Crècy, Poitiers and Agincourt. When men put aside the bow and arrow for the gun, archery disappeared from the battlefield, and at the present time only savage races use the archer's weapons in hunting or warfare.

Archery is now a popular and fashionable sport in England, Canada and the United

States, though to a less extent in the latter countries than in the first-named. See Bow and Arrow.

ARCH'IBALD, Sir Adams George (1814-1892), a Canadian statesman, one of the leaders in the movement for Confederation and the first lieutenant-governor of Manitoba. He was born at Truro, N. S., educated at Pictou Academy, and called to the bar of his native province in 1839. He entered public life in 1851 as member of the Nova Scotia assembly, and after 1856 held in turn the positions of solicitor-general of Nova Scotia, attorney-general and advocate-general in the vice-admiralty court at Halifax. He was a member of the Charlottetown and Quebec Conferences, and played an important part in the work preceding Confederation. When Confederation was won in 1867, he became a member of the Dominion House of Commons and for a year was also Secretary of State for the colonies in Sir John A. Macdonald's Ministry. In 1870 he was appointed first lieutenant-governor of Manitoba, a position of great responsibility because of the disorders at the time (see Manitoba, subtitle *History*). He resigned in 1873, later served two terms as lieutenant-governor of Nova Scotia, and from 1888 to 1891 again sat in the House of Commons.

SIR ADAMS GEORGE ARCHIBALD



ARCHIMEDEAN SCREW

ARCHIMEDEAN, *ahr ki mee' de an,* **SCREW,** a device for raising water, said to have been invented by Archimedes. It consists of a hollow spiral tube bent around a cylinder, as shown in the illustration. The device is inclined, the lower end being immersed in the water; the upper end has a handle by which the apparatus may be turned. The water is gradually raised from one bend of the tube to the next and finally flows out of the upper end. The Archimedean screw, in ancient times, was used in the Nile valley for draining and irrigating land, and it is now sometimes employed where it is desired to raise a large quantity of water not more than ten or fifteen feet, with the expenditure of little power. See Archimedes.

ARCHIMEDES, *ahr ki mee' deez* (287-212 B. C.), the greatest mathematician who lived before the Christian Era, and the discoverer of the principle of specific gravity (which see). He was born at Syracuse, in Sicily, and probably studied at Alexandria, after which he returned to his native city and there passed the rest of his life.

His discovery of "Archimedes' principle," on which the theory of specific gravity is based, occurred, according to legend, in the following manner. Entrusted by the ruler of Syracuse with the task of finding out whether a certain goldsmith had used all the gold turned over to him in making a crown, Archimedes pondered long over the question. One day while in the bath he noticed how his body made the water rise, and then came to him the two principles—that a body displaces a quantity of water equal in bulk to itself, and that the loss in weight of the body immersed in water equals the weight of the water displaced. Excited by his discovery, the absent-minded philosopher leaped from the bath and ran through the streets crying "Eureka! I have found it!"

Archimedes also discovered the principle of the lever, and boasted that if he had but a place to stand upon and to rest a lever upon, he could move the world. The Archimedean screw (which see) was also constructed by him, as were various burning mirrors and hurling engines much used during sieges. After the siege of Syracuse, where with his burning glasses Archimedes had fired the Roman fleet, a Roman soldier, rushing into the philosopher's study, found him calmly drawing geometrical figures. Not noticing the soldier's drawn sword, the old man cried, "Don't disturb my circles." Enraged, the soldier slew him.

ARCHIPELAGO, *ar ki pel' a go,* a word derived from two Greek words meaning *chief*

sea, now given to any sea, or portion of a sea, containing a large number of islands. The name is generally applied to the islands themselves, but this is not strictly correct. The Aegean Sea is the most notable archipelago in the world, and the name was first given to it by the Greeks to distinguish it from all other seas. See AEGEAN SEA.

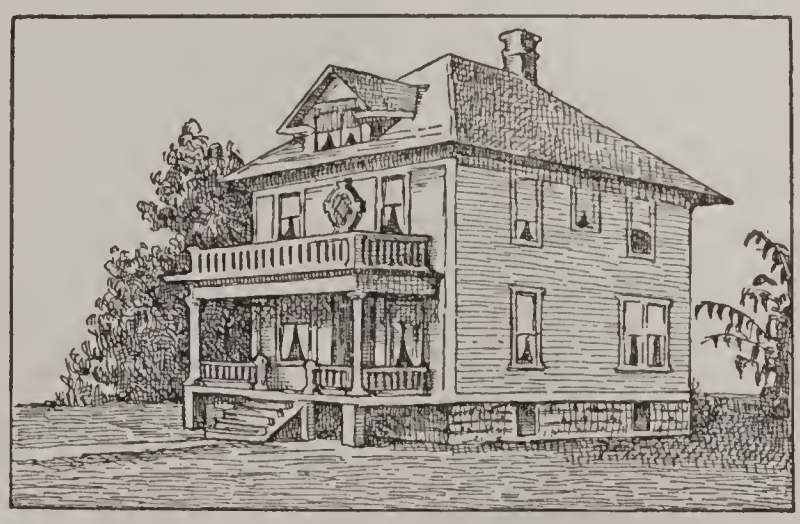
ARCHITECTURE, *ar' ki tek ture.* Goethe said, "Architecture is frozen music." In a striking way he emphasized man's accomplishment in making art walk hand in hand with unemotional science, which takes account only of endurance, utility, stress and strain in the construction of a building. That brick and stone and marble may be so utilized that the realization of an architect's dream may stir the esthetic emotions is reason enough for placing architecture among the fine arts. It is therefore proper to class architects of vision with painters and sculptors. They all produce objects good to look at and sometimes inspire a spiritual exaltation in the beholder.

Is a building well proportioned? Are the details of it pleasing to the eye and does the structure as a whole seem to fit well in the landscape? Is its style suited to the purpose for which it was built; that is, if it is a schoolhouse does it look like a schoolhouse and not like a barn with windows, or if it is a home does it appear comfortable and inviting? These are the questions we ask ourselves when we see a building, and on our conclusions we are apt to base our opinion of the architect.

But if buildings were only beautiful few could be well utilized. Usefulness, except in monuments and purely decorative structures such as arches of triumph, is even more essential than attractiveness. If an architect is to design an office building he must know the relative cost of building with different materials and the expense of labor for each kind of work. More important still, he must understand how to arrange the space so that it will bring the greatest possible rent, must know how many elevators are needed to serve the people who will occupy the building, what heat is most effective and economical, and how much window space is necessary to give proper light. He must be able to estimate exactly how much strength is required at each point, and know how to gain this strength with the least cost.

Houses. "Home," said Pliny, "is where the heart is." A home, then, more than any other structure, should be harmonious. It should be pleasing to the eye, both inside and out, and give to its folk that comfort which will make it, to quote the poet, James Montgomery—

> "the spot of earth supremely blest,
> A dearer, sweeter spot than all the rest."



COMFORTABLE, BUT UNATTRACTIVE
A house an owner would probably design for himself.

PLEASING TO THE EYE
The architect would design a home something like this.

Surely, then, there is no greater field for architecture than in home-building, and yet it is only within the last generation that the art and science of home planning has developed. In earlier years kings had their palaces designed by architects, and rich men imitated them; but splendor and magnificence were commonly sought rather than true charm.

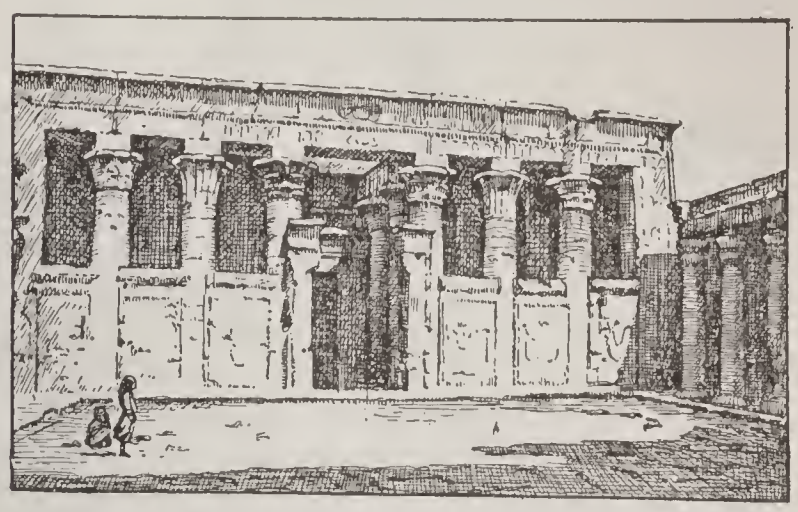
To build a home in this age without the aid of an architect is only a little wiser than to attempt to make one's own automobile. This does not mean that the architect is to be given an order for a house and the owners must accept whatever he chooses to give them. A home, to be enjoyed to the utmost, should be an expression of its owners' thought. Perhaps the master of the house would like his library arranged in just such a way, and the mistress is longing for a certain kind of kitchen and many closets for clothes and linen, and both have definite ideas about a porch, a fireplace or a sun parlor, and many other details; but if they attempt unaided to combine their ideas in one structure they find the task most difficult. Or, perhaps they have admired certain houses which they have seen, but have no very exact notion of their wants. In either case a good architect can soon find the way, if there is any, to embody the dreams of his clients, besides adding many conveniences which they never would have suggested, thus making the whole structure quite unlike any other, a "thing of beauty," which, says Keats in *Endymion*—

> "is a joy forever;
> Its loveliness increases; it will never
> Pass into nothingness."

The services of an architect are not beyond the purse of anyone who is building. Usually the fee for designing is only six per cent of the cost, and for supervising construction an additional four per cent. Thus one who plans to spend $2,000 on a little home may have expert help for $200, and if the architect is competent he will save more than this amount in construction costs.

Architecture Old and New. Most of us know, when we see a building, whether it pleases or displeases us, but few of us can tell why. To gain a true appreciation of cause and effect, a knowledge of what renders a structure attractive or makes it offend the eye, we must study the story of architecture. When we learn how men have gradually approached a knowledge of true beauty we shall gain more of that knowledge for ourselves. In so doing we shall add greatly to our enjoyment of good architecture, for our eyes will be opened to many beautiful things which we have never before noticed.

Early Efforts. It is in the cradles of civilization, Egypt, Assyria and Babylonia, that we find the first successful attempts to give beauty to the work of the builder. The tombs and temples of ancient Egypt, some carved out of



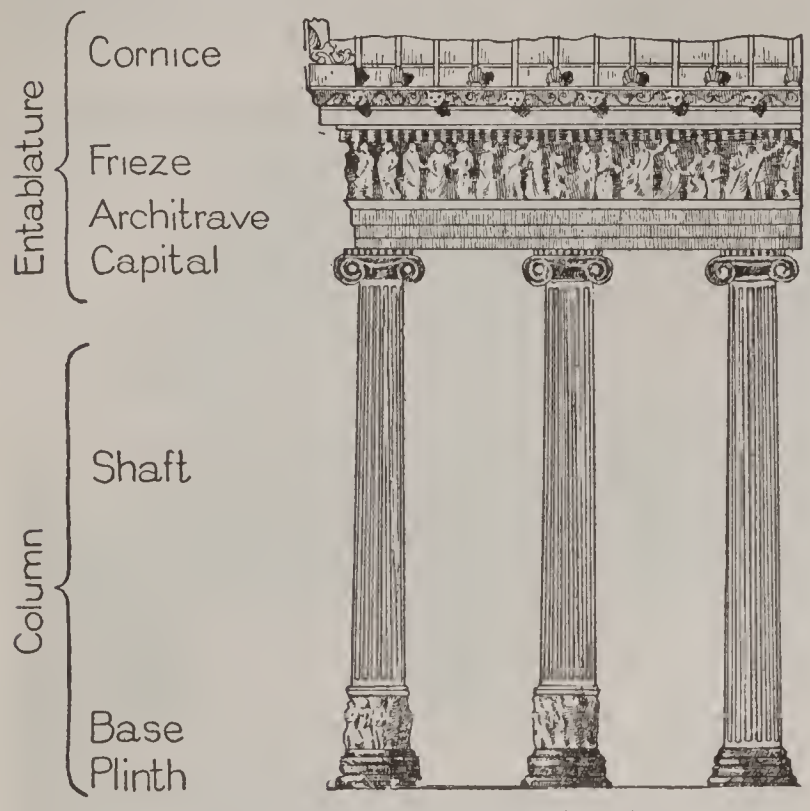
EGYPTIAN TYPE OF ARCHITECTURE
The temple of Edfu, begun 237 B. C., by one of the Ptolemies.

the solid rock, others formed of massive blocks of stones, are silent testimonies to the aspirations of a race which believed in the endless life of the human body as well as of the soul. They have a dignity and an air of eternity unequalled by any other works of man. Both carving and color added to their charm, but the heavy walls and close grouping of columns, the flat roofs and the predominance of straight lines give them a depressing solemnity. All of these features will be appreciated after a study of the pictures of the ruins of Karnak which appear in the article EGYPT, and of the illustration here shown of the temple of Edfu.

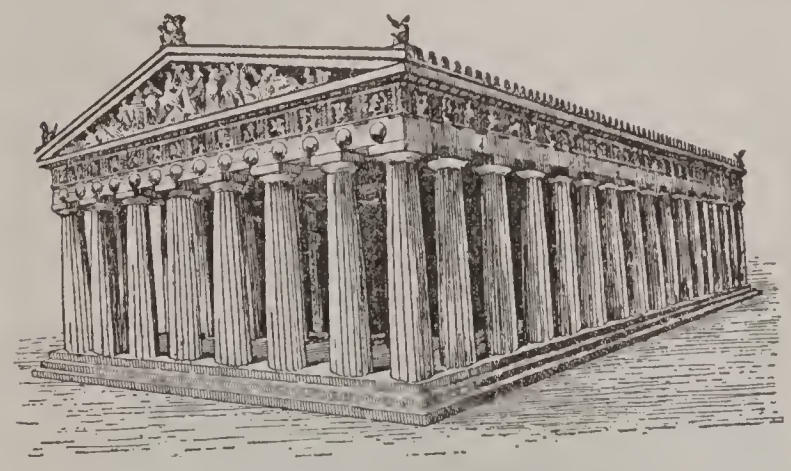
Many centuries before civilization in the Nile valley reached its height, the Babylonians and Assyrians developed an architecture which resembled the Egyptian only in its straight lines and flat roofs and massive walls. The Assyrians had little stone, the Babylonians none at all, and neither had timber. Sun-dried brick was their building material; with it they erected huge palaces with walls often thirty feet thick and usually no farther apart, roofed with primitive vaults. The rooms were high-ceiled, long and narrow. Windows were impossible in walls of such depth, so there could be no second story to shut off light from above. Decoration was gained with glazed tile, painting and carving.

"The Glory That Was Greece." Of the many debts which architects of the last two thousand years owe to their fellows of ancient Hellas,

and especially to those of the age of Pericles (about 460-430 B. C.), none exceeds the indebtedness felt for the sense of proportion the Greeks gave us. The Parthenon at Athens, inspiring even in ruins (see the illustration that heads this article), is unequalled as an example of a building whose parts all bear a pleasing relation to each other and to the whole. Proportion is a matter which has no exact science; yet it is one of the most vital questions in architecture. If you were describing the Parthenon you would not speak of it as a narrow building, nor as a wide building; you would not say it was high or low. Far more than mere adjustment of the three dimensions was necessary to gain this effect of perfection. Notice, for a single instance of the care which the builders exercised, that the three columns of each corner have less distance between them than have any of the others. But for this arrangement the temple would appear distorted because of the contrast between the bright sky, forming the background at the edges, and the dark inner walls at the center.



COLUMN AND ENTABLATURE
A part of "the glory that was Greece."



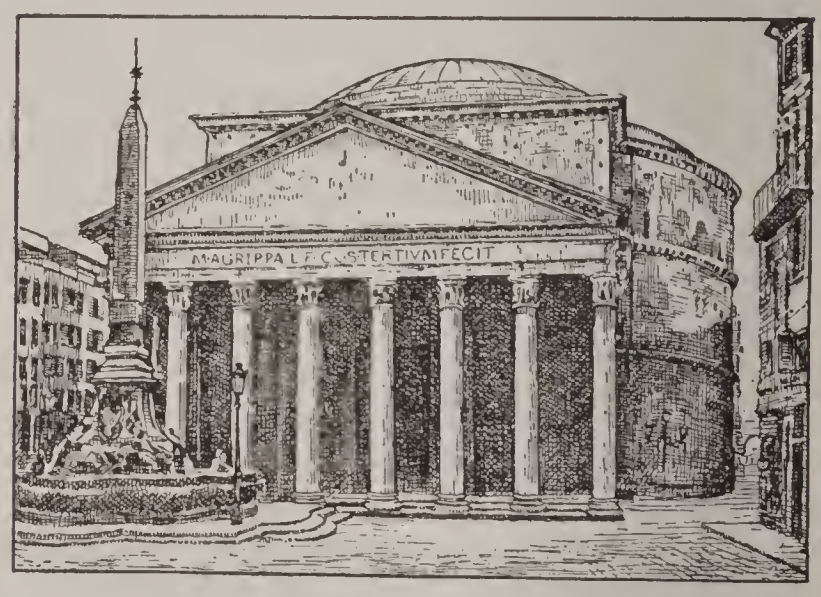
WHERE ATHENS WORSHIPPED ITS PATRON GODDESS

The Parthenon, completed 435 B. C. This picture is from the restored model in the Metropolitan Museum, New York City.

Harsh, straight lines are avoided in Greek structures by the adoption of soft, almost imperceptible curves. Thus the columns in the Parthenon do not taper like pails set upside down, but with a graceful, gradual change of direction.

Details characteristic of Greek public architecture were the low-pitched roofs of timber covered with tile, the terraced steps, the sculptured friezes. Red and blue paint, gold and dull yellow wax gave warmth to the cold, white stone. The three types of columns—Doric, Ionic and Corinthian—are described and illustrated in the article COLUMN, and each of three famous buildings, the Erectheum, Theseum and Parthenon has an article.

"The Grandeur That Was Rome." Before the rise of the imperial city on the banks of the Tiber, the Etruscans, whose home was farther north in Italy, had become experts in the use of the arch. From them the Romans copied it, and made the semi-circular arch the distinguishing feature of their work. In other respects their architecture is largely a modification of Greek styles. With the arch it was possible for the Romans to construct interiors of a size previously not dreamed of, and to substitute bricks and small stones held together by cement for the enormous unmortared slabs of Egypt and Greece. The great arches of aqueducts and bridges; the enormous vaults of the baths, sometimes over one hundred feet high; the dome of the Pantheon; all are tributes to the skill with which Roman architects and engineers utilized the new knowledge. But the semi-circular arch required ex-



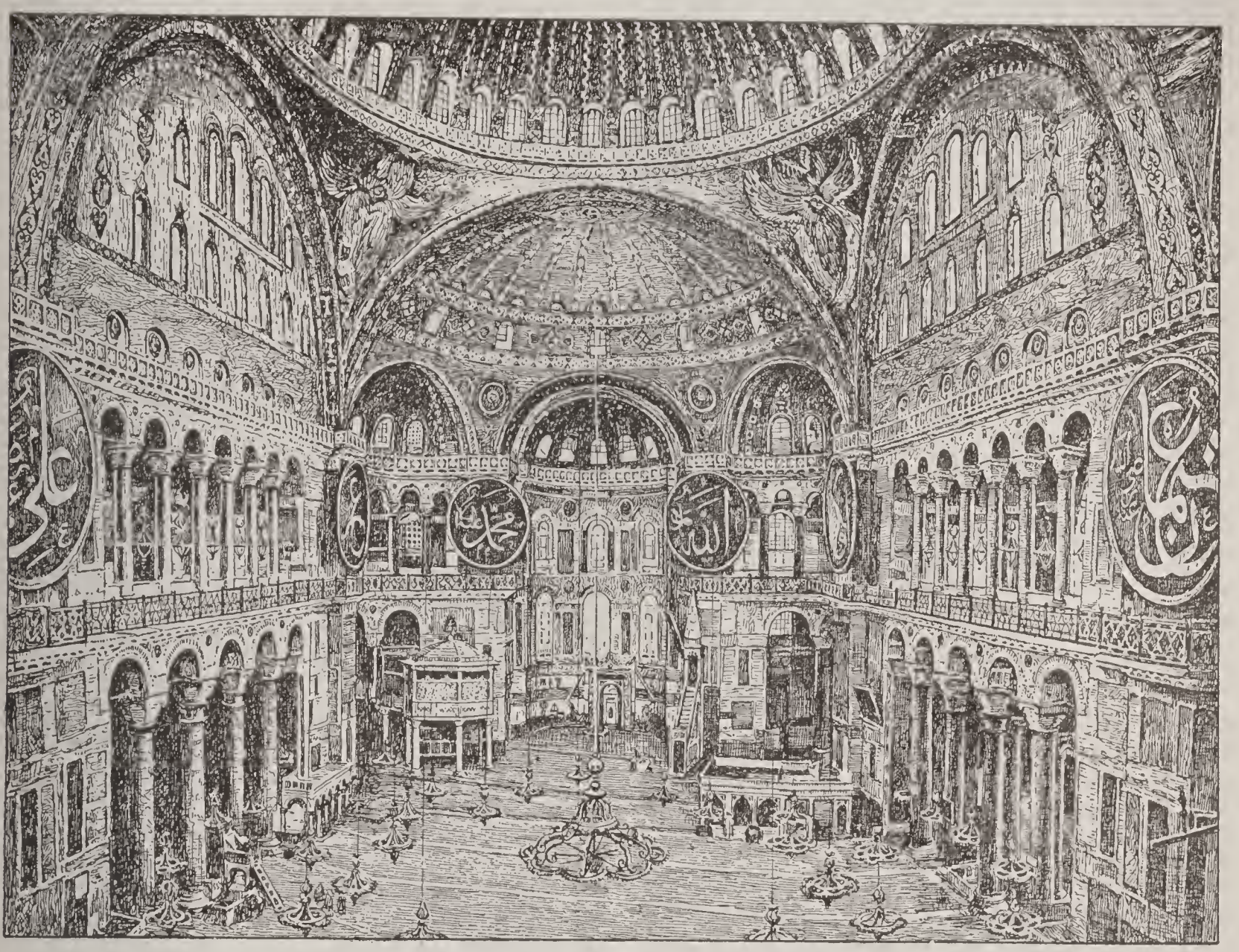
THE PANTHEON OF AGRIPPA
A heritage from the grandeur of the Roman Empire.

ceedingly heavy walls for its support, for reasons which are explained in the article BRIDGE, and made Roman works impressive for their size rather than for their grace.

The Pantheon, as rebuilt by the Emperor Hadrian in the second century A. D., is an illustration of both the Greek and the Etruscan influence on Rome. From the outside it is truly not a pleasing structure; the square, pillared entrance does not accord with the massive circular walls. Inside, however, the huge dome, over 140 feet in both diameter and height, is striking. Other Roman edifices are told of and pictured under the headings COLOSSEUM; FORUM; AMPHITHEATER; AQUEDUCT; ATRIUM; BASILICA; and BATHS AND BATHING.

After Rome. The fall of Rome was not the fall of all things Roman. The Empire of the Caesars had left its stamp upon the languages, laws and religion of the Western world, and to an even greater extent on its architecture. Wherever Roman soldiers went people learned to build the arch, the vault and the dome.

In the East, the mingling of Roman and Oriental ideas produced a style known as *Byzantine,* of which the church of Saint Sophia in Constantinople, erected in the sixth century, is typical. From the outside this huge pile of brick is unattractive, but its interior, before Turkish occupation in 1453, was probably the most gorgeous in the world. Red, green and black marble, precious stones, mosaics—all have a part in it, yet there is no confusion of colors, for all are placed according to a defined scheme. Much of the gracefulness of this interior is due to the placing of the dome upon square walls, a feat of construction unknown to the Romans. It was accomplished by means of *pendentives,* curving brackets of stone at the corners, which, as may be seen from the accompanying illustration, formed an arch on each of the four sides and carried the weight of the dome to the corners. Saint Mark's, Venice, another famous Byzantine church, resembles Saint Sophia's in many respects.



INTERIOR OF SAINT SOPHIA

In the West early Christian churches were formed in imitation of the basilicas or halls of Roman residences. There was nearly always a long room bordered with pillars; an aisle on each side whose roof was lower than the central roof and permitted a *clerestory,* or row of windows, above it; and an *apse,* or semicircular

projection, at the end. These features, which are illustrated in the picture of Saint Paul's

FOURTH CENTURY CHRISTIAN BASILICA
Interior of "Saint Paul Outside the Walls," as rebuilt after a destructive fire of 1823.

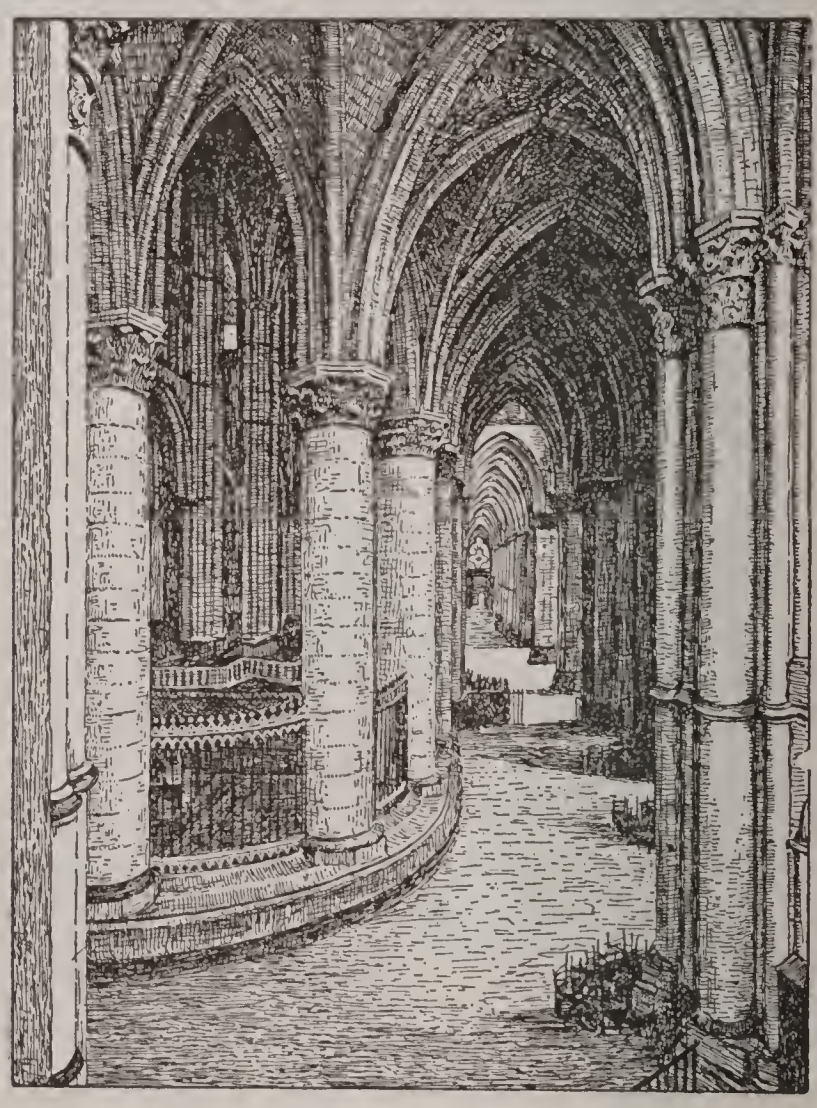
Outside the Walls, have influenced church architecture from Constantine's time to the present day.

There was in the West no type of architecture to blend with the Roman and form a style corresponding to the Byzantine in the East. What took place was a gradual development into the fashion called *Romanesque*. In general the tendency was away from the heaviness of the older construction. In Lombardy vaults were supported by ribs at the intersections of surfaces (see the article VAULT and the picture of a groined vault), the ribs resting on pillars and making massive walls unnecessary. In Burgundy architects learned to construct groined vaults in oblong shape in place of the square vaults to which others had been confined. In Germany first, then elsewhere, the church tower was made a part of the main building, instead of a separate structure (see CAMPANILE).

Gothic, the Expression of a New Life. The student of architectural history misses half the interest of his subject if he does not notice how clearly the buildings of a nation or of an age may indicate the spirit of the times. The solemnity of old Egypt, the keen intelligence of Greece, the unconquerable will of Rome—are all recorded in brick and stone. When we come to the age of awakening understanding which preceded the glorious rebirth of Europe, called the *Renaissance,* we find an example even more striking. Emerson calls the Gothic cathedral "a blossoming in stone" and adds: "The mountain of granite blooms into an eternal flower, with the lightness and delicate finish, as well as the aerial proportions and perspective of vegetable beauty."

Structurally Gothic architecture is marked first of all by the pointed arch, which can be raised to impressive heights without increase in width, needs no heavy walls to resist its outward thrust and permits vaults of any shape. In true Gothic style there is not a wasted stone. All weight is carried by a skeleton of arches, piers and flying buttresses; real walls are almost lacking, for the spaces between outside piers are filled by lofty windows.

The Gothic style had its birth in France. It was copied in England and Germany, Spain and Italy, but nowhere in its purity. Various modifications arose, mostly with elaborate ornamentation (see GARGOYLE; TRACERY; TUDOR STYLE). Gothic structures described elsewhere in this book are the cathedrals of Notre Dame, Lincoln, Cologne, Rheims, Milan and Amiens. The first of these is pictured under its own



IN A GOTHIC CATHEDRAL
The graceful arches of a choir-aisle in Rheims Cathedral, built in the thirteenth century.

heading, the second appears in the illustration at the head of this article, and with the third and fourth, under CATHEDRAL.

The Renaissance and After. It was in Italy that the reawakened interest in the works of past ages which characterized the Renaissance first manifested itself. Here architects were able to study the fragmentary remains of classical Roman structures, and to adopt into their own practice those elements which pleased them best. After the visit of the court of

King Charles VIII of France to Rome in 1494, the revival of classic forms began to influence French architecture, and soon spread to other countries. It is characteristic of the new age that other edifices than churches were now thought worthy to try the architect's skill, and the palaces, castles, chateaus and town halls of the Renaissance period show plainly that their designers were influenced by those of far-off, imperial Rome.

The Church of Saint Peter, at Rome, is a product of this age of classical study. Its great cupola, constructed in the second half of the sixteenth century according to plans which Michelangelo had drawn, may be seen in the upper part of the page of illustrations with the article VATICAN. The dome, like that of the Pantheon, is formed entirely of masonry without the timber frame found in most European domes. But its umbrella-like ribs, and the lack of the Pantheon's heavy walls, show the lessons learned in Romanesque and Gothic vault construction. The big *drum,* or circular wall, beneath the dome, and the small drum above, are each marked by a row of pillars shaped to give the appearance of pairs of classic columns. In the lower picture on the same page may be observed other examples of the fashioning of details after ancient models; at the center Greek roofs over the two windows in the small tower, and the pilasters, or flat decorations made to look like pillars supporting them; at the top of the building at the right, the colonnades, or rows of columns, and their Greek gables. A picture of the Louvre, perhaps the best instance of French Renaissance architecture, appears in the article on that building.

Since the Renaissance the practice of studying the best work of days gone by has continued. Fresh problems have arisen, especially in America, where the sky-scraper built with a skeleton of steel or concrete has transformed the science of building. But so far no new style worthy to succeed has been evolved. In the exterior design of a modern tall building two of the tasks of the architect are to avoid the monotony which is apt to result from the multitudes of regularly arranged windows, and to prevent the great height of the structure from making the dimensions seem poorly proportioned. In solving these problems the architect draws from his knowledge of the achievements of past centuries. Thus, as any observer may discover, many recently constructed office buildings have elements of classic or of Gothic design. Continuous vertical strips between windows often end at the top in pilasters, and cornices are almost universal. The striking resemblance between the tower of the Woolworth Building, the tallest of tall buildings, and those of Lincoln Cathedral, built nearly six centuries earlier, is shown at the head of this article. C.H.H.

AN HISTORIC STYLE

Adapted to modern needs. The University Club, Chicago, called the finest example of pure Gothic in America.

Consult Sturgis's *How to Judge Architecture;* Ruskin's *Seven Lamps of Architecture;* Reinach's *Story of Art Throughout the Ages.*

Related Subjects. The following lists, which contain general architectural topics, buildings of note, and the world's greatest architects, will give to the reader a comprehensive view of the subject:

GENERAL

Abbey
Aqueduct
Arabesque
Arcade
Arch
Atrium
Basilica
Beam
Blue Print
Bungalow
Campanile
Capital
Capitol
Cartouche
Caryatides
Castle
Cathedral
Chimney
Circus
Cleopatra's Needles
Cloister
Column
Corbel
Cupola

OUTLINE AND QUESTIONS ON ARCHITECTURE

Outline

I. What It Is

(1) An art
(2) A science

II. What Good Architecture Means

(1) Beautiful buildings
(2) Suitable buildings
(3) Useful buildings

III. Development of Architecture

(1) Earliest forms
  (a) Egyptian
    1. Dignity
  (b) Babylonian and Assyrian
    1. Material
    2. Style
  (c) Greek
    1. Sense of proportion
    2. Avoidance of harsh lines
    3. Three types of columns
  (d) Roman
    1. Arch
(2) Latin styles
  (a) Byzantine
  (2) Later styles
  (b) Romanesque
  (c) Gothic
    1. Pointed arch
  (d) Renaissance

IV. Modern Problems

(1) Home-building
(2) "Sky-scrapers"

Questions

If you wished to build a home should you consider it wise to draw up your plans and turn them over to a building contractor?

What three demands must every perfectly successful building fulfil?

What is the greatest debt which later architecture owes to the Greeks?

In what style of architecture is the capitol of your state or province?

How can you recognize Gothic architecture infallibly?

What is regarded as the most perfect building ever constructed?

May an architect be a "pure artist," or must he have a definite knowledge of certain material things?

In what suggestive manner did Goethe define architecture?

Have you ever seen a building which seemed to you to fit this definition? Do most of the houses, stores or churches which you pass?

What are some of the difficulties which the architect of a modern sky-scraper has to overcome?

The Woolworth Building is 750 feet high and weighs 360,000,000 pounds. Is it as tall as the greatest pyramid? Does it weigh as much?

What were the distinguishing marks of Egyptian architecture?

What was the great architectural achievement of the Romans?

Did the architects of the eighteenth or nineteenth century develop any new style of architecture?

Could the Romans have built their great bridges and aqueducts if they had never developed any new architectural form?

What are Cleopatra's needles?

What was the building material of the Babylonians and Assyrians?

Who was the architect of the dome of Saint Peter's?

Is there in Europe any good example of Mohammedan architecture?

What is a *clerestory?* An *apse?*

How did Emerson describe Gothic architecture?

Dome	Obelisk
Facade	Pagoda
Finial	Pediment
Gable	Pendant
Gargoyle	Pendentive
Indian Architecture	Pilaster
Keystone	Roof
Labyrinth	Rose Window
Lateran	Seraglio
Loggia	Spire
Mansard Roof	Temple
Minaret	Tower
Mohammedan Architecture	Tracery
	Transept
Mosque	Tudor Style
Nave	Vault
Norman Architecture	Window

FAMOUS BUILDINGS

Abbotsford	Palais Royal
Alhambra	Pantheon
Arch of Triumph	Parthenon
Athenaeum	Pitti Palace
Buckingham Palace	Quirinal Palace
Choragic Monument	Saint Mark, Cathedral of
Colosseum	
Eiffel Tower	Saint Peter's Church
Erectheum	Saint Sophia, Church of
Escorial	Statuary Hall
Holyrood Palace	Theseum
Invalides, Hotel des	Uffizi
July, Column of	Vatican
Kaaba	Versailles, Palace of
Louvre	Washington Arch
Luxembourg Palace	Washington Monument
Monticello	Westminster Abbey
Notre Dame, Cathedral of	Westminster Hall
	Windsor Castle

Most of the great cathedrals, as Lincoln, Milan, Rheims, are described in the articles on the cities in which they are located.

ARCHITECTS

Bramante, Donato	Hunt, Richard Morris
Brunelleschi, Filippo	Michelangelo Buonarroti
Bulfinch, Charles	
Burnham, Daniel	Wren, Sir Christopher

ARCH OF TRIUMPH, called by the French Arc de Triomphe de l'Etoile (*triumphal arch of the star*), situated at the head of the Champs Elysées, one of the most beautiful streets in Paris, is the largest triumphal arch in the world. It was begun by Napoleon Bonaparte in 1806, to commemorate his victories, and was completed by Louis Philippe in 1836. Harmonious in proportions and imposing in design, this famous structure rises to a height of 160 feet. Its central archway is forty-eight feet broad and ninety-five feet high, and on its inner walls are inscribed the names of 384 of Napoleon's generals and ninety-six of his great triumphs during the period of his glory. Among the striking decorations are four groups of colossal figures, sculptured in high relief. One of these symbolizes the departure of the volunteers of 1792.

ARCH OF TRIUMPH

A monument to the successes of the great Napoleon—but without a suggestion of the end at Saint Helena.

ARCHON, *ar' kon,* the highest officer in ancient Athens. The first archon was chosen by the nobles from the royal family of Codrus, the last king of Athens, and his term of office was for life. In 752 B.C. the length of the term was shortened to ten years, and in 714 B.C. the archonship was thrown open to all the nobles. In 682 B.C. the number of archons was increased to nine, and thereafter they were chosen every year. The reforms of Solon gave anyone who had a certain amount of property the right to hold the office, and in 477 B.C., under Aristides, this right was given to all Athenian citizens. After 508 B.C. the archons were chosen by lot. The first of the nine archons, called *the Archon,* gave his name to the year in public records; the second had the care of the religious interests of the people; the third, the *Polemarch,* was the war archon. The other six were the lawgivers of the state.

ARCOLA, Sask., a town 113 miles southeast of Regina and 253 miles west of Winnipeg. It is a divisional point on the Arcola-Regina branch of the Canadian Pacific Railway, and has been for years the chief shipping center for a rich grain-growing region. The land in the Arcola district is slightly rolling, very fertile and well watered by Moose Mountain

River and other smaller streams. Fish Lake, eighteen miles north of Arcola, is a summer resort, with good boating, bathing and fishing. The town is the center of the Cannington judicial district (Southeastern Saskatchewan), and has the district Land Titles building, erected in 1913, and a courthouse, completed in 1910. Population in 1911, 794; in 1921, 605. P.B.T.

desolate northern region. The Arctic Circle just touches the northern headlands of Iceland, cuts off the southern and narrowest portion of Greenland, crosses Fox's Strait, north of Hudson Bay, whence it extends westward to Bering Strait, continuing across Northern Russia, the White Sea and the Scandinavian Peninsula to Iceland. See map accompanying the article ARCTIC LANDS AND SEAS.

LANDS AND WATERS OF THE FROZEN NORTH

ARCTIC CIRCLE. At the North Pole the year is divided into six months of night and six months of day. The Arctic Circle, represented on the globe as a circle twenty-three and one-half degrees distant from the north pole and parallel to the equator, indicates roughly the boundary of this alternate daylight and nightime zone. The name comes from *arktos,* by which the constellation Great Bear was known to the Greeks (see BEAR, GREAT).

When the sun reaches the Tropic of Cancer on its northward journey, its rays shine day and night over the whole area between the Arctic Circle and the North Pole. When, however, it reaches the Tropic of Capricorn, twenty-three and one-half degrees from the South Pole, darkness prevails over this same

ARCTIC, *ark' tik,* **LANDS AND SEAS,** barren, inhospitable regions of snow-covered lands and ice-bound seas situated between the Arctic Circle and the North Pole. The name Arctic Ocean is applied collectively to all the gulfs, bays and seas within the Arctic region. The ocean washes the most northerly shores of Europe, Asia and America, is connected with the Pacific Ocean by Bering Strait and with the Atlantic Ocean by Davis Strait, and by a wide passage between Greenland and Norway. It contains numerous islands, the largest of which are Greenland, Spitzbergen, Franz-Josef Land and Baffin Land, although only part of the latter is within the Arctic Circle. To the north of Canada there are the ice-bound islands which constitute the Arctic Archipelago.

Animal Life. Fur-bearing animals are very numerous in Arctic lands and are well able to withstand the rigors of the climate. The polar bear, fox, musk ox, lemming and hare abound, and the Eskimo dog and reindeer have been acclimatized and domesticated. Whales of several species, seals and walrus are found in most parts of the ocean. Birds are very plentiful. Gulls of all kinds are found in thousands wherever there are cliffs for nesting places; snowbirds, ravens, sandpipers, falcons, ducks, geese, petrels, puffins and ptarmigans are also among the regular inhabitants of these northern regions. There are valuable fisheries on the northern coast of Russia; more than 125 varieties of fish have been caught in Arctic waters, the chief food fishes being cod, halibut and several kinds of flat-fish. Trout and salmon are found in some Arctic rivers, and mollusks, including clams, mussels and squids, are plentiful.

Plant Life. About 1,700 species of Arctic plants have been classified, many closely resembling Alpine vegetation. Poppies and saxifrages blossom in the extreme north of Greenland, and flowering mosses and lichens are everywhere common. Trees, chiefly dwarf willows, birches and junipers, occur in the most southern portions, but are absent farther north. It is generally agreed among authorities that the dry winds and not the extreme cold prevent the growth of trees, as in the coldest parts of Siberia trees thrive, because there is more humidity in the atmosphere.

Mineral Wealth. In Greenland a mineral called cryolite, once extensively used in making aluminum, and now much used in the manufacture of enameled ware, is mined; fossil ivory is obtained in Northern Russia, especially in the delta of the River Lena; and the numerous islands north of Canada contain coal of good quality. At present, difficulty of access and lack of transportation render these coal fields valueless, but a railway financed by the United States government for the purpose of developing the coal fields and copper mines of Alaska is under construction. Gold has been extensively mined in Alaska. Petroleum is known to exist.

Climate. The temperature varies considerably in different localities within the Arctic regions, but on the average it is much below 32° Fahrenheit. On the American continent inland temperature averages 30° below zero at the Arctic Circle. In Northern Siberia at Verkhoyansk, the coldest place in the northern hemisphere, the winter temperatures sometimes range below 60° for weeks at a time. The temperature of the water of the Arctic Ocean is higher than that on the ice-covered land, varying from a few degrees above freezing point to a few degrees below that point.

Ice Formation. The ice of Arctic lands and seas constitutes much of the scenic feature of the region. In Greenland and some of the larger islands ice has accumulated more rapidly than it has melted. This accumulation is known as *paleocrystic ice.* The great ice-sheet of Greenland in places is thickly covered with fine dust having a chemical composition not unlike volcanic ash; and the material, it is thought, came from the nearby volcanoes of Iceland, having been carried hither by the winds. Very small spherules of iron also have been collected, and these, without doubt, are of meteoric origin. In the vicinity of Disko Bay, Greenland, the steep slope of the coast causes a sliding movement, or flow of the ice-sheet, forming Humboldt Glacier. As the edge of the glacier is pushed into the sea, great masses of ice are broken off and float southward through Davis Strait. The icebergs thus borne into the route of transatlantic commerce become a double menace. Collision with them has sent many a steamship to the bottom; the dense fog which they help to create adds greatly to the dangers and discomforts of transatlantic passenger service.

Sea ice takes various forms. The narrow shelf of ice that skirts the cliffs is called the *ice-foot.* Where waves break on sandy beaches, sand is plentifully mixed with the water, and the mixed sand and ice form the *shore barrier.* The freezing of the surface of comparatively still sea water, sometimes to a depth of several feet, forms the *ice-sheet,* or *ice-field.* When on-shore winds become strong the ice-field is broken into blocks that are piled up and crunched against the shore, forming an *ice-pack.* The accumulated force of the wind and water combined is so great that the side crunch hurls great blocks of ice several feet into the air. A ship caught in the pack is usually a fixture for three or four months, and many a one has been hopelessly crushed at the breaking of the pack. Detached masses floating about constitute *floes;* or, if finally broken, *sludge.* In the navigable fiords and estuaries ice sometimes forms around the anchors of vessels lying there, finally accumulating until its buoyancy causes it to rise to the surface; this is known as *anchor-ice,* or

ground-ice. See POLAR EXPLORATIONS; NORTHWEST PASSAGE. J.R.

Consult Nansen's *Farthest North;* Peary's *The North Pole.*

ARCTURUS, *ark tu' rus,* a star of the first magnitude in the constellation of Boötes, next to Sirius, the dog star, the brightest in the northern hemisphere. It is so distant from the earth that it takes 125 years for its light to reach us, yet it is much nearer than many other stars. To locate it, follow the curve of the handle of the Dipper; the continued line will point direct to Arcturus, the *Bear Driver,* a star of ruddy hue. See, in article ASTRONOMY, illustration of location of heavenly bodies.

ARDMORE, *ard' mohr,* OKLA., the county seat of Carter County, in the south central part of the state, the center of a vast oil-producing section. It is 100 miles south of Oklahoma City, and nearly the same distance north of Fort Worth, Texas. It is on the Gulf, Colorado & Santa Fe; the Chicago Rock Island & Pacific; the St. Louis & San Francisco, and the Oklahoma, New Mexico & Pacific railways. The population, 8,618 in 1910 and 14,181 in 1920, is largely American, including a few Indians and a number of negroes. The area of the city exceeds three and a half square miles.

Ardmore is situated twelve miles south of the Arbuckle range of hills, and is surrounded by a series of lakes. Within a radius of forty miles from the city are eight oil fields; a number of large pipe lines extend from them to Ardmore. In the vicinity are also large deposits of asphalt and extensive zinc fields. Throughout the country are many large cattle ranches and farms, whose produce includes fruits, cotton, corn, cereals and forage crops. The important industries of the city include oil refineries, cotton compresses, flour mills, the largest cigar factory in Oklahoma and an asphalt brick plant.

In addition to the public school system, Ardmore has Saint Agnes Academy, a commercial school, night schools (one for white, and one for colored students), and a government Indian school. The prominent buildings of the city are the Federal postoffice erected in 1916 at a cost of $185,000, the county courthouse, costing $165,000, the high school building, costing $150,000, a Carnegie Library and the Hardy Sanitarium.

Ardmore was founded in 1887. It was in a region which was the home of a large part of the Chickasaw and Choctaw nations. It was incorporated in 1898 and has since adopted the commission form of government. In the fall of 1915 a tank car of gasoline on the tracks of one of the railroads in the city, exploded, causing the death of forty-three persons, injuring 350 others and destroying property valued at $500,000. Claims against the railroad company were satisfactorily settled out of court through the efficient arbitration of a city commission and road officials. C. OF C.

AREA, *a' re a,* a Latin word meaning piece of level ground, has come to have in English several different meanings. In arithmetic and geometry the area of a surface is the number of square units it contains, as square inches, square feet, etc. (see MENSURATION). Often the word is used to mean any open space, as, "Within this area the entire city was built." It is also applied to the open space of a narrow front yard, or a back court. The early Christians gave the name to the sections of consecrated ground in which the faithful were buried. The word *area* is also used in describing particular parts of the cortex of the brain. The various areas of the brain are indicated in the article BRAIN (which see).

AREOPAGUS, *air e op' a gus,* the oldest court of justice of ancient Athens, so named because its meetings were held on the Hill of Ares (Mars), directly west of the Aeropolis (see MARS' HILL). In the time of Solon it was composed of those who had once been archons (see ARCHON), and the term of office was for life. This court tried cases of murder, had general oversight of the morals of the people, and could fine citizens found guilty of extravagance, insolence or any form of intemperance.

AREQUIPA, *ah ra ke' pah,* an old city of Peru that has been conspicuous in the history of its country. It is the capital of the department of the same name and is situated on the Chile River in a fine dry climate 7,000 feet above sea level. Mollendo, with which it is connected by rail, is 100 miles southwest. Arequipa is one of the best built cities in South America; it has good streets, a cathedral, two national schools and a university. At a height of over 8,000 feet above the sea, overlooking the city, is a branch of the Harvard Observatory containing the largest photographic telescope ever constructed. The people are employed chiefly in the making of jewelry and the cutting of precious stones. The city has some commercial importance, as it is the center of trade for the interior

of Peru. It was founded by Pizarro in 1540. In 1600 and again in 1868 it was nearly destroyed by earthquakes. Population in 1920, 35,000.

ARETHUSA, *air e thu' sa,* in Greek mythology, a beautiful nymph, one of the attendants of the goddess Diana, who changed her into a fountain to free her from the too ardent courtship of the river god Alpheus. But the god, changing himself into a swift torrent, still pursued her, and Diana in pity opened for her an underground passage through which she fled until she came to the upper world on the plains of Sicily. The god, however, followed her in the regions below, and, passing from Greece to Sicily, joined his loved one where the fountain sparkled under the bright Sicilian skies.

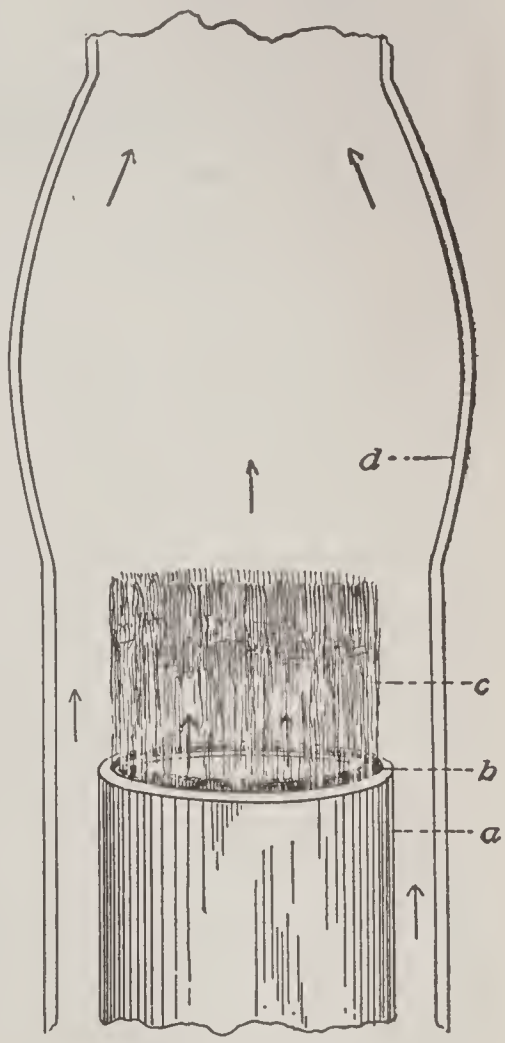
The Greeks based the pretty story on the peculiar course of the Alpheus River, which, as it flows through Arcadia toward the Ionic Sea, now and then disappears below the surface. Near the seacoast on the Sicilian plains a beautiful fountain bubbled up, and the imaginative Greeks liked to believe that it contained the waters of the Alpheus. Shelley wrote the story of Arethusa in his poem of that name.

Arethusa is also the name of two species of the orchid family, one growing in North America, the other in Japan. See NYMPH.

AREZZO, a city of Northern Italy, capital of the province of Arezzo, in Tuscany. It is fifty-four miles southeast of Florence and has a beautiful situation on the slopes of a hill, commanding a charming view of the surrounding fertile country. Arezzo is the episcopal see of Tuscany, and its cathedral, a fine example of Italian Gothic, was begun in the thirteenth century. Many imposing buildings, broad streets, a museum and picture gallery, a noted academy of science and a library are among the attractions of the city. It has manufactures of cloth, silk fabrics and leather. In the ancient times Arezzo, then called *Arretium,* was one of the richest cities of Etruria, and was especially famed for its pottery and copper work. The city was the birthplace of Petrarch and other famous men. Population (city and suburbs) in 1915, 50,093.

AR'GAND LAMP, a lamp invented about 1784 by the Swiss chemist Aimé Argand, which was one of the earliest improvements on the old-fashioned oil lamp. The old-style lamp was simply a shallow vessel containing oil, into which a short rounded wick was dipped. The light was obtained by the burning of the oil vapor which rose from the wick. The amount of surface of the oil-vapor that came in contact with the air was so small that only a little of the carbon of the oil burned, and the rest rose in the form of smoke which gave off unpleasant odors.

Argand's lamp had a burner that created enough heat to burn up all of the carbon. He made a wick in the form of a hollow cylinder, which he placed between two metal tubes, one within the other. A circular flame was thus produced, and both the inside and outside of this flame were supplied with air; the result was a clearer light and a lamp that did not smoke. One of Argand's workmen discovered by accident that a glass chimney placed around the flame created a draft and made the light steadier and brighter. The Argand burner is widely used to-day.

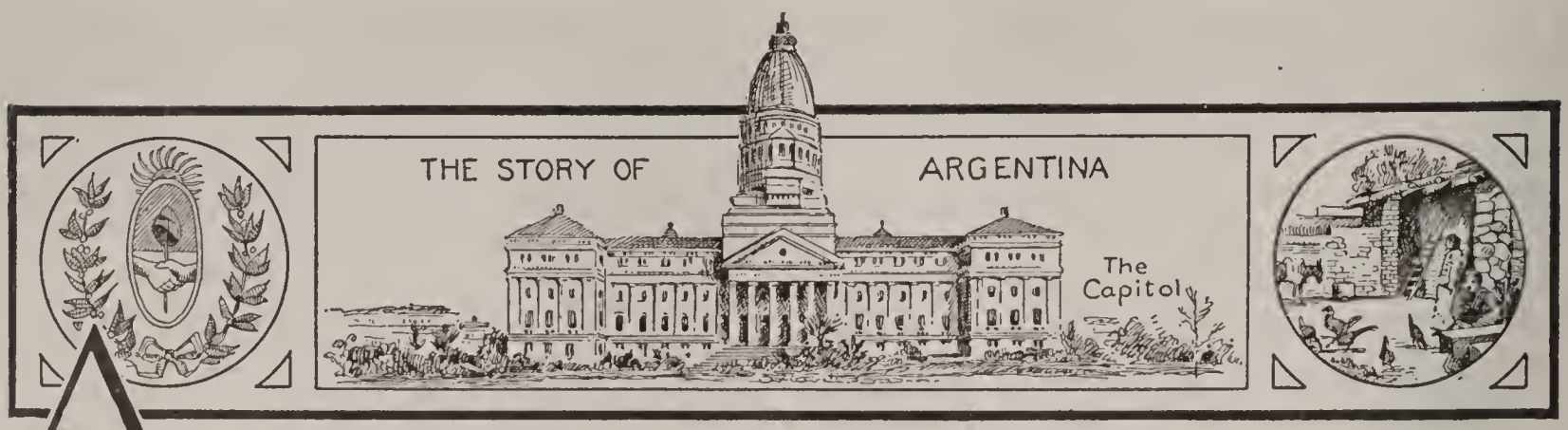


ARGAND LAMP

(a) burner; (b) wick; (c) flame; (d) chimney. Arrows indicate air currents.

ARGENTA, ARK., now North Little Rock, is centrally located in the state, on the north bank of the Arkansas River, almost directly opposite Little Rock, the state capital. It is on the Saint Louis Southwestern; the Saint Louis, Iron Mountain & Southern, and the Chicago, Rock Island & Pacific railroads. The population, which in 1910 was 11,138, was 14,048 in 1920. The area is three square miles.

Argenta has a city hall, built in 1915 at a cost of $100,000, two parks and a United States military post, Fort Logan H. Roots. The principal industries include railroad shops, cotton compresses, cotton-seed oil mills, hardwood mills, stove factory, cooperage and boiler and iron works. Natural gas is used for manufactories and for domestic purposes. The town was founded in 1870 and became a city in 1906. N.R.



ARGENTINA, *ar jen tee' nah,* the popular name for the nation officially termed ARGENTINE REPUBLIC, which is the largest Spanish-American country of South America. Brazil, its great neighbor, is more than twice as large, but Brazil is Portuguese in its origin, customs and language. No other Spanish-speaking nation on the continent is so populous, so rich as Argentina, or, except Chile, so favorably situated as to climate.

It has 1,153,000 square miles, a larger area than all of the United States east of the Mississippi River plus all of the states bordering that stream on the west, except one-third of Louisiana. Its population was reported to be 8,698,516 in 1921; the six small New England States alone have nearly as many people. When it is understood that about one-seventh of Argentina's people are in one city (the magnificent capital, Buenos Aires), it is clear that the vast expanse of the country is sparsely settled. In Buenos Aires there are over 18,000 people to the square mile; in some entire inland provinces there is only one person to three square miles. Comparing Argentina with Canadian provinces, we find that it has over twice the combined area of Alberta and Saskatchewan, and nine times the number of people.

ARGENTINA

Location, in black, shows the proportion of the continent occupied by this great country.

The People and the Cities. In its population Argentina presents a strange contrast to other Spanish-American lands. We find here a Babel of European languages, a hive of human industry, a metropolis unapproached in size by any other Spanish-American city or by any city of Spain itself, or by any city in the world south of the equator, and an almost feverish striving for material wealth. The steady industry of Northern Spain, from which the early settlers sò generally came, is united with the imagination and enterprise of less steady peoples. Spanish conservatism is offset by a striving for the new in modern life and achievement.

Within the past half-century Argentina has received nearly twice as many immigrants from Italy as from Spain. Two and one-third millions of Italians have been added to its citizenry within the period named. At one time it was thought not unlikely that their language might become the language of the whole population; but the Spanish tongue, marvelous in its perfection and easy to acquire, has held its own, and all immigrants have been assimilated in the population. These include French, Russian, German, British and Portuguese, in large numbers, together with other nationalities, and the population continues to grow rapidly with streams of immigration. Thus far, but few North Americans have sought permanent homes in Argentina, though some (like Thomas B. Wood in the educational and religious world and others in commercial and industrial fields) have long been conspicuous there. The number of such persons from the United States and the Dominion of Canada will grow with the increasing acquaintance and mutual appreciation between the Northern and Southern peoples of this hemisphere, whose interests have so much in common, despite the barriers of language and traditional influences.

Argentina, like Chile, has been free from any negro problem, for it never contained any African population worth mentioning. The Indian and mestizo (mixed Indian and white) population, which is insignificant and perhaps does not exceed a total of 100,000, is relatively decreasing through the immigration of Europeans. Of the latter, the Jews formed no

part until 1891, and then they began to come from Russia only.

Buenos Aires, the capital, is considered a rival of Paris as a beautiful metropolis; its population, 1,560,000 in 1914, is increasing rapidly, 1,674,000 having been claimed for it in 1920 (under the title BUENOS AIRES there is a full history of the city). No other city in the country is known to many people in North America, but some are gaining rapidly in importance; the second city is Rosario (222,592); others coming into prominence are Cordoba (104,894), La Plata (90,436), Tucuman (91,216), Bahia Blanca ((44,143), Mendoza (60,000), Parana (36,089).

Location and Climate. Argentina is almost wholly within the temperate zone; it therefore enjoys all the climatic conditions that the habitable regions of the United States and Canada offer, but conditions of the seasons are exactly reversed. When the snows of winter cover a large part of North America, Argentina is engaged in harvesting. It lies wholly south of the equator, its northern boundary being 22° south latitude, and its southern, 55° south. Havana, Cuba, lies in about 23° north latitude; if a map of Argentina is folded over a map of North America, drawn on the same scale, Argentina's northern boundary will touch Havana, and the island of Tierra del Fuego (part of which Argentina owns) will reach to Hudson Bay.

It is a natural supposition, then, that the range of climate of this southern republic would average well with that of the United States and Lower Canada, and that those industries which thrive in North America would be the leading ones in Argentina. These conclusions are largely true, particularly with respect to products, but there are certain climatic differences worthy of note.

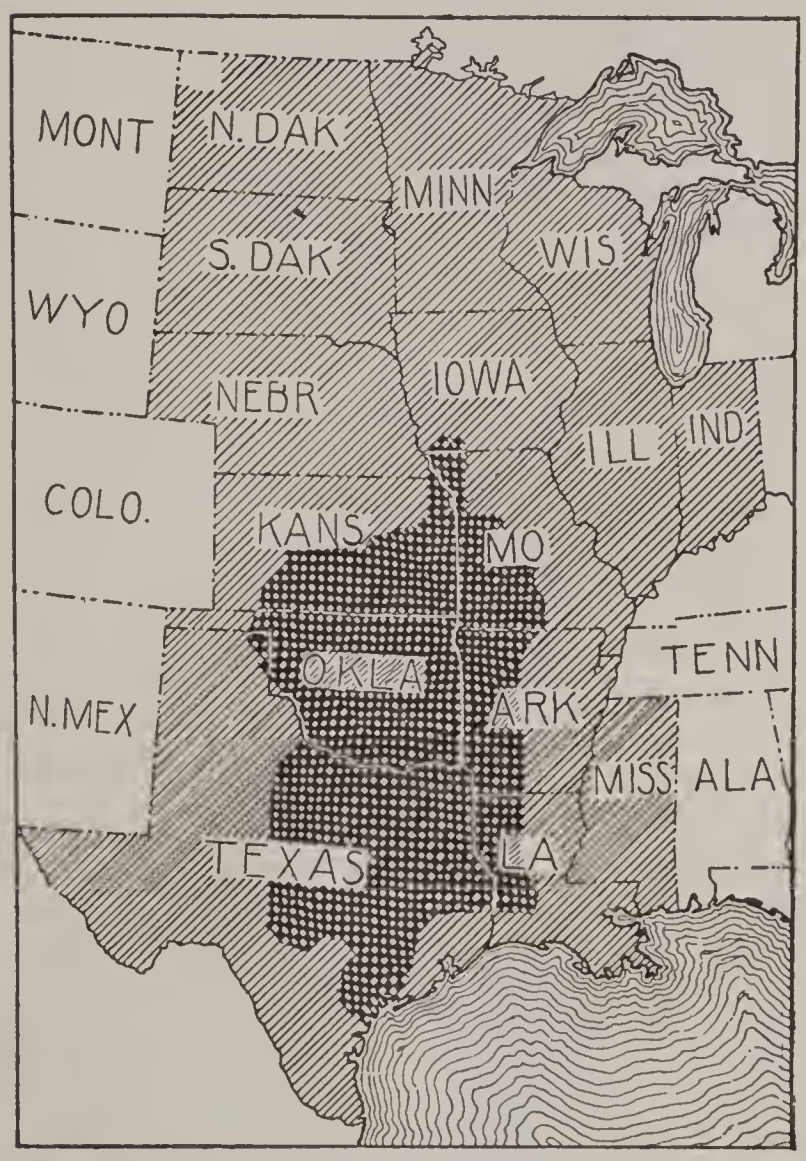
The North American continent in the latitude of Labrador is cooled by the downflowing Labrador Current from the icy Arctic regions; part of the Southern Argentina coast (the Northern Patagonia section) is modified in temperature by the Equatorial Current (still warm when it reaches the far southern latitude), which makes possible a vast southern area suitable for stock-raising. However, to offset this advantage somewhat, cool winds blow across the lofty Andes Mountains from the west. Much of the lower third of the country is arid, because the winds from the mountains lose their moisture before reaching the plains. This is also true of a wide belt running the entire length of the country bordering on the lofty western mountain ranges. The elevation of the land ranges from sea level, along the east coast, to several thousand feet, in the Andes, and has an average of about 2,000 feet in the minor ranges which are a part of the Andean system. The rainfall is over sixty inches in the east, decreasing to as little as two inches in the plateau region.

Over half of Argentina borders on the Atlantic Ocean on the east, giving the country nearly 2,000 miles of coast line; on the remainder of the eastern boundary and on the north Argentina meets Uruguay, a corner of Brazil, Paraguay and Bolivia. Chile extends the entire length of the country on the west.

Some idea of the region of Argentina in the latitude of Talcahuano, Chile (near Concepción), as it appeared more than six decades ago, has been acquired from Jules Verne's popular romance *The Children of Captain Grant*. In this well-known story a party of men led by Lord Glenarvan cross the continent from Talcahuano eastward on the 37th parallel without guides, through the Andean pass of Antuco and on through the entire breadth of Argentina, experiencing earthquake, storm, avalanches, fight with a condor, etc., and reach the Atlantic coast in safety. The chief value of this narrative at the present day is the contrast between the conditions portrayed by the romancer and the actual conditions of our time, in that land of marvelous development. No one should permit himself to be misled by thinking of it as a picture of the present. Nor is the portrayal of a journey across the continent in this region of the world in pioneer days confined to tales of romance. Biographers of the great Pope Pius IX relate with some detail his arduous march, in his young manhood, in 1823, with members of an ecclesiastical commission, from Buenos Aires over the pampas and through the mountain passes to Santiago, Chile. This first Pope to outlive "the years of Peter" was the first and only Pope that ever visited any part of America at any time in his life; and the story of his rigorous American experiences has given us an interesting picture of the Argentine life and environment of nearly a century ago.

Industrial Life. The day is not far distant when Argentina will be a very important factor in the world's commerce; already welcome evidences of this are at hand. The United States cannot provide sufficient fresh meat

for the needs of its people at the former low prices; Argentina's plains are ample for the raising of many millions of head of cattle, and beef from that land is reaching the markets of the world in increasing quantities. The cattle of the republic are worth (1916) a little more than $700,000,000. The shipment of meat and of live cattle from Argentina has assumed enormous proportions. The exportation of animal products in 1913 reached the value of $300,000,000. Great Britain received much the larger part of this, but the shipments to the United States are growing rapidly. There are ten freezing and chilling establishments for meat, and more are under way. Argentina was the first country to send frozen meat to Europe, and its salting of meats is declining.



GRAIN ZONE

The lightly-shaded section indicates Argentina's total area as compared with the United States. The heavily-shaded section represents the proportion of the total area on which various grains are raised. In South America this extends from 28° S. to 41° S., corresponding roughly to the distance from Galveston to Central Kansas and from the center of Arkansas and Louisiana to Central Texas. It is thus seen that Argentina's wheat lands extend only to 41° S., while, by contrast, Canada's wheat area extends to about 55° N.

Wheat is a great crop in Argentina, and the acreage is rapidly increasing. About 15,000,000 acres are in this cereal, and millions of bushels of wheat are exported annually to Europe. Of corn, the second crop in importance, there are annually over 10,000,000 acres under cultivation. Next in importance are flax, oats, barley and rye. Of Argentina's 730,000,000 acres, 255,000,000 are fit for cultivation or for cattle industries. Some day irrigation will greatly increase the latter area.

Almost all minerals needed for industrial development lie in the mountains of Argentina. There is much gold and there are also coal, iron and tin. Mining has not materially decreased the country's mineral riches, for there has not been much development of these resources. Oil has been found in paying quantities.

Communication. The distance from Buenos Aires to New York, 4,370 miles, is covered by steamers in about twenty-three days; about the same time is required for a trip to Liverpool, England. There are two regular mail steamers from and to each of these cities every month. The trip from Rio de Janeiro is made by steamboats in about five days. With one exception, the Uruguay, the rivers of the republic flow southeast or east; the direction of the Uruguay is nearly south, along the eastern boundary. Three of the rivers, the Paraguay, Uruguay and Parana, form the great La Plata system (see La Plata, Rio de La); these encourage commerce because they are navigable for several hundred miles into the interior, and unite to a degree the business interests of Argentina, Paraguay and Uruguay (see map, with article South America). The bulk of the commerce of the country enters and leaves by the Rio de la Plata, and Buenos Aires is the center of nearly all the trade. But the best natural harbor, by far, is 500 miles south, at Bahia Blanca, where the government has established a great naval station.

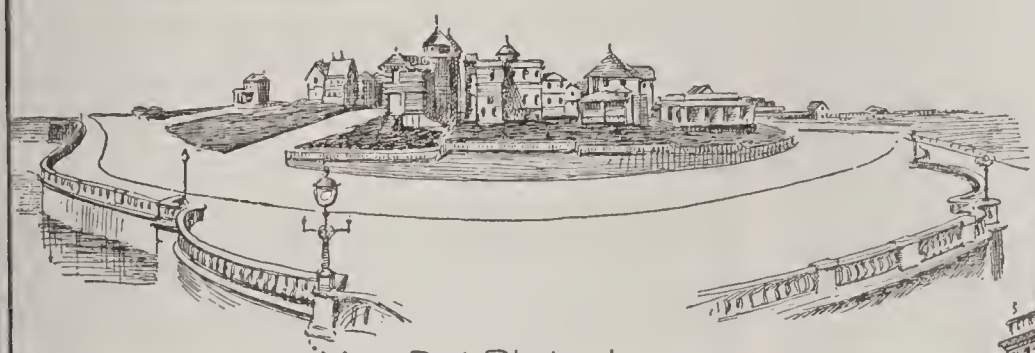
In 1857 Argentina possessed six miles of railroad; in 1914 there were 21,880 miles; and during the next two years, over 3,000 miles were ordered built. Over 45,000 miles of telegraph lines, with 140,000 miles of wires, are in operation, and there are thirteen wireless telegraph stations. The government controls the telegraph monopoly, and owns 3,500 miles of the country's railroads.

Education and Religion. Spanish traditions and Roman Catholicism are inseparable. The Roman Catholic religion is in part supported by the government, but there is freedom of other worship. Before 1884 only Church marriages

ARGENTINA

Independence monument, Buenos Aires

On the plains of the interior



Mar Del Plata terrace, a fashionable watering place

A Buenos Aires residence. Few better found in North America.

An Argentina cowboy, and his home.

Railway station, Buenos Aires.

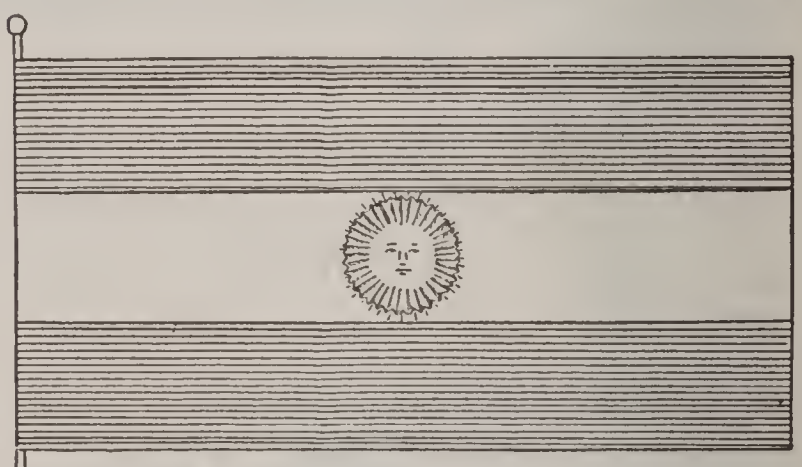
were legal; in that year civil marriage was legalized. Education of children from six to fourteen years of age is compulsory, and a recently-improved system of free secular schools is making its influence felt. The government is yearly adding largely to its expenditures in this direction, and the illiterate population of fifty-five per cent in 1905—which was less than the corresponding population in several of the countries of Europe—is now only fifty per cent. There are sixty-seven normal schools for the training of teachers, five national universities and numerous colleges. The national observatories at Cordoba and La Plata enjoy a reputation in Europe and America.

Commercial Opportunities. Business opportunities for North Americans in Argentina are generally associated in the mind with great corporations and the investment of large capital; and indeed, North American enterprise is to be witnessed in the business of such corporations in various lines of production. It is nevertheless a fact that contracts for the construction of public works are usually made with European companies, and that North American salesmen have not learned to compete very successfully with agents of European houses in securing orders for wholesale trade. Various reasons are offered for this. Continental Europe makes use of the metric system of weights and measures, which is universally used in South American lands; and other weights and measures are foreign and perplexing. Further, the North American system of credits is more restricted than that of European houses, which are generally ready to extend the time of payment considerably beyond the time to which wholesale houses in the United States are accustomed. Further, North American shippers have acquired in Spanish America a reputation for carelessness in the packing and shipment of goods, and for delays in shipping, and however much or little this reputation may be deserved it remains to be overcome by care and promptness in the future.

But probably these matters count for less than the barrier which is found between peoples in difference between peoples in education and in habit relating to social matters. Representatives of European houses acquire the speech, social customs and sentiments of representative Argentinos, and do not seem to be foreigners. A knowledge not only of the rudiments of Spanish speech, but also of the idioms of commerce, avoids misunderstandings. A similarity of tastes in literature, art, music and drama, and a common historical and religious inheritance, constitute a bond of sympathy which cannot but influence trade relations.

There is much opportunity offered in Argentina for small retail trade establishments such as the "ten cent stores" of Northern lands. A *Monte pio* (small loans on collateral) is guarded in the interests of the poor, and is controlled by the municipality. The business of supplying *mate,* or Paraguayan tea, is growing rapidly. The *quebracho flojo,* or iodina, a hardwood tree of Argentina, produces a dye much used in South America. Another, quebracho, rich in tannin, produces a very handsome red.

Government. Argentina is a federal republic, with a constitution in many respects similar to that of the United States, adopted in 1853 and twice amended. The President is chosen by electors, and serves six years; both



ARGENTINA NATIONAL FLAG

Outside stripes, blue; middle stripe, white; sun, yellow.

he and the Vice-President must be Roman Catholics, and neither can succeed himself. The legislative department comprises a Congress, of which the Senate, with thirty members, and the House of Deputies, of 120 members, are the two branches. Senators serve nine years; Deputies, four. There are fourteen provinces (states), ten territories and one federal district (Buenos Aires). The constitution gives to the provinces full control of affairs purely local. There are provincial legislatures, also elected.

History. Sebastian Cabot, commanding a Spanish expedition in 1526, named the La Plata River, and founded upon its banks a colony which Spain at once claimed and developed as a dependency of Peru. In 1776 some semblance of home rule was granted to the La Plata colonists; but Spanish rule was oppressive, and in 1810 the colonists declared their independence. Years of war and disorder

followed, and it was not until 1825 that the first President of the new republic was elected.

Like the United States, Argentina has sought by its constitution to avoid both the extremes of centralized government and local self-government, by maintaining both national and state (provincial) legislative bodies. The struggle between the extremists began almost with the inception of the government. Rivadavia ended his short service in the Presidency by resigning in 1827. Dorrego, who followed, was deposed by Lavalle; and the popular Rosas, governor of Buenos Aires, was proclaimed dictator. As an incident of the republic's half century of strife with its neighbors, Great Britain and France intervened in 1845 to save Uruguay. Urquiza succeeded in overthrowing Rosas in 1852. Ten years later, it was believed that the happy mean had been reached between the *unitarians* (centralists) and the federalists by the adoption of the constitution of 1853. This provides for a Presidential term of six years, following the precedent of the constitution of the so-called Confederate States—adopted in the preceding year.

The first and second Presidential terms under the new constitution were filled respectively by General Bartolome Mitre and General Domingo F. Sarmiento, both of them distinguished authors and publicists and men eminent in ability and leadership. The nation prospered. President Sarmiento founded the National Observatory at Cordoba and appointed as director the distinguished astronomer Benjamin Apthorp Gould, of the United States. From 1865 to 1870 Argentina was compelled to war against the Paraguayan dictator, Francisco Solano Lopez, who was finally suppressed.

In 1878 the President of the United States, Rutherford B. Hayes, chosen as international arbiter, settled the boundary between Argentina and Paraguay, making the Pilcomayo River the dividing line. In 1880 General Julio Roca was chosen President. He was rather a soldier than a statesman, and achieved but a partial success. Juarez Celman was elected in 1886. The credit of Argentina declined under his reckless and scandalous administration. The great banking house of Baring Brothers, in London, financial agents of the Argentine government, failed in 1890, and a financial panic swept over the republic. The President was compelled to resign, and his term was completed by Carlos Pellegrini, who had been Vice-President. Dr. Saens Peña, who was chosen in 1892, was an able jurist, but failed as an executive, and resigned in the third year of his term, being followed by the Vice-President, Uriburu, in orderly succession. An event of President Peña's term was the settlement by President Grover Cleveland of a disputed boundary, making the Pequiry River the line of demarcation through the disputed border. General Roca was called back to the office of President in 1898, and he proved a great force for peace. The western boundary of Argentina was settled permanently, it was believed, by the arbitration of the United States minister; and the question of ownership of the south end of the conti-

CHRIST OF THE ANDES

The great Peace Statue erected jointly by Argentina and Chile. In his book, *South America, Observations and Impressions,* Hon. James Bryce makes this note of the act and of the spirit of the two countries:

"On the level summit of the pass stands the Christ of the Andes, a bronze statue of more than twice life size standing on a stone pedestal rough hewn from the natural rock. . . . There had been a long and bitter controversy between Chile and Argentina over the line of their boundary along the Andes, a controversy which more than once had threatened war. . . . After years of careful inquiry an award was delivered and a boundary line drawn in which both nations acquiesced. Grateful for their escape from what might have been a long and ruinous strife, they cast this figure out of the metal of cannon, and set up here this monument of peace and good-will, unique in its place and in its purpose, to be an everlasting witness between them."

OUTLINE AND QUESTIONS ON ARGENTINA

Outline

I. Position

(1) Latitude, 21° 55′ to 55° 2′ south
(2) Longitude, 53° 40′ to 73° 17′ west
(3) Boundaries

II. Size and Shape

(1) Length, 2,200 miles
(2) Breadth, 1,000 miles in north to 200 miles in south
(3) Area, 1,083,596 square miles
(4) Comparative size
(5) Wedge-shaped

III. Surface

(1) Vast, flat plain in east
(2) Interior highlands
(3) Plateau and peaks in northwest

IV. Drainage

(1) Easterly flowing rivers
  (a) The Rio de la Plata
  (b) The Parana
  (c) The Paraguay
  (d) The Salado
(2) Salt marshes in central provinces

V. Climate

(1) Temperate
(2) Climatic differences compared with United States
(3) Arid regions and rainfall

VI. Products and Industries

(1) Stock-raising
(2) Agricultural products
(3) Mining

VII. Inhabitants

(1) Language and characteristics of the people
(2) Small rural population; cities
(3) Immigration
(4) Roman Catholic religion
(5) Compulsory education; decrease in illiteracy

VIII. Transportation and Commerce

(1) Communication with New York and Brazil
(2) Buenos Aires and other ports
(3) River navigation
(4) Railroads
(5) The North Americans' part in the business of Argentina

IX. Government and History

(1) A republic
(2) Early exploration
(3) Colonial government of Spain
(4) Independence
(5) Political struggles of the republic
(6) Boundary difficulties with Chile and Paraguay
(7) International coöperation of South American countries

Questions

Why does the country near the Andes have but little rainfall?

What are some of the reasons for the success of European salesmen in Argentina?

What celebration was held in 1910?

Where do the Argentine farmers buy most of their machinery?

Has the country an extensive coast line?

How are the pawnshops prevented from charging excessive interest, and what are they called?

Which country gives more attention to alfalfa, Argentina or the United States?

How is Tierra del Fuego cut off from the rest of the country?

What are Argentina's two great crops?

What three heads of foreign nations have helped Argentina settle its disputes with its neighbors?

What are the meanings of Argentina, La Plata, Buenos Aires and Tierra del Fuego?

Outline and Questions on Argentina—Continued

What places in North America have latitudes equivalent to those of the north and south extremes of Argentina?

How long does the President serve? Under what circumstances may he be reëlected?

Are there many tenant farmers?

What minerals are there in the country?

To what extent does the world depend on Argentina for corn?

What is the largest city in the southern hemisphere?

What are the opportunities for education?

How do Argentine farmers store their corn?

How important is the cattle industry?

Does the country rank high as a producer of flaxseed?

What story of Jules Verne's tells of adventure in Argentina?

What striking comparison can be made between Canadian and Argentine facilities for handling grain?

How does the constitution resemble that of the United States?

Is the country thickly-settled?

What part of your electric light bulb may come from Argentina?

What explorer is connected with the early history of Argentina whose father figures in that of Canada?

Are there many railroads?

How long would it take you to get to Buenos Aires?

What two Presidents have also been successful literary men?

What influence had Napoleon on the history of Argentina?

What is a *mestizo?*

Is Argentina the largest nation in South America?

What are the *pampas?*

What significance has a certain monument in the Andes?

Compare the country in size with the United States.

How does the southern limit of wheat-growing in Argentina compare with the northern limit in Canada?

Is the country more or less densely populated than Canada? Than Alberta?

If all the inhabitants were removed to Texas, would that state be more or less densely settled than is Illinois?

What language do the people speak?

In how many cities larger than the capital of Argentina is that language spoken?

How important is the negro problem?

During the last half century, from which European country did most of the immigrants come?

For what is Bahia Blanca noted?

What great churchman visited Argentina?

How long does it take to go by water from Buenos Aires to Rio de Janeiro?

What provision is made for the training of school-teachers?

What substitute for tea is popular?

How many cities have more than 100,000 inhabitants?

Why does not Argentina prepare so much salt meat as formerly?

Compare the country, as to size and population, with the combined provinces of Alberta and Saskatchewan.

nent was happily arbitrated by King Edward of Great Britain. The beginning of a lasting peace, with the settlement of old issues in 1892, was marked in a singularly impressive manner by the construction of the famous monument and statue known as the *Christ of the Andes.*

There is no other statue in the world so significant of peace and commerce as this one, which marks the boundary line between Argentina and Chile. So long as the countries quarreled over their boundary and other matters, there could be no effective coöperation in the great work of interoceanic railway construction and maintenance. It was an Argentine lady, Señora Angela de Costa, who conceived and urged the plan of erecting on the sublime eminence an enduring figure of the Saviour of men, to solemnize the pledges upon which the future peace was based. And then, after forty years of thwarted effort, the desired international coöperation began.

In 1904 Dr. Manuel Quintana was elected President; but he died two years later and was succeeded by the Vice-President, Dr. José Figueroa Alcorta. In 1910 Roque Saenz Peña became the chief magistrate; and in the same year the centennial of Argentine independence was celebrated with great magnificence by an exposition conducted at Buenos Aires. Upon the death of President Saenz Peña, Vice-President Victorino del Plaza became President.

Additional Facts of Interest. Argentina mines several hundred tons of tungsten ore each year. In this it is exceeded only by Burma, the United States, Portugal and Australia.

Though the wheat crop of Argentina is usually greater than that of Saskatchewan and Alberta, the total elevator storage capacity of the country in 1917 did not equal that of the three Dominion elevators at Moose Jaw, Saskatoon and Calgary. In all Argentina outside of the ports there are not as many elevators as there are at the average railroad station in the west of Canada or the United States.

The most southerly town in the world is Ushuaia, on Beagle Channel, established by Argentina as a colony for desperate criminals. It has about four hundred inhabitants.

Argentina produces and exports nearly one-half of the world's flaxseed.

This country exports more corn than all the other countries in the world combined, though its annual production of two to three hundred million bushels is only one-tenth that of the United States.

The wheat crop is only from fifty to eighty per cent that of Canada, but the yield per acre is so much less that it requires from one and one-fourth to one and one-half times the acreage.

The *pampas* is the name given to the vast fertile plain sloping toward the sea which is the cereal zone of the country. Most of the very few trees in this region have been planted by the settlers.

Rio de la Plata means *river of silver;* Sebastian Cabot called it this because the natives told him that there was a large amount of this metal along its upper waters. *Republica Argentina* means *silver republic; Buenos Aires* is literally *good airs,* and *Tierra del Fuego* is *land of fire.*

Argentina devotes 12,000,000 acres to alfalfa, nearly three times as many as the United States.

During the Napoleonic wars the British occupied Buenos Aires. This action showed the people that Spain was helpless to protect them, and when Napoleon made his brother Joseph king of Spain a definite movement for independence began.

Till 1912 Argentina was Canada's best customer outside of the British Empire and the United States. Since that time, however, Canadian business in South America has decreased.

Seventy per cent of the agricultural implements imported into Argentina are manufactured in the United States.

The corncribs of Argentina are usually built with walls of corn or cane stalks, and some farmers grow small patches of cane solely for this purpose. In building a *troje,* as a crib is called, poles fifteen feet or more in length are first placed in the ground in the form of a circle, and wires are strung across the inside of the poles. The stalks are not fastened, but are held against the wires by the corn.

The War of the Nations brought a great increase in trade between Argentina and the United States. During the first three months of 1916, imports from the United States were more than twice as great as for the corresponding period in 1915.

Tierra del Fuego is separated from the rest of the country by a narrow body of water whose name is known to every boy and girl who has been to school—the Straits of Magellan.

R.S.N.

Related Subjects. A more detailed knowledge of Argentina may be gained from a study of the following articles:

CITIES AND TOWNS

Bahia Blanca
Buenos Aires
Cordoba
La Plata
Mendoza
Rosario
Santa Fe
Tucuman

COAST WATERS

Atlantic Ocean

ISLANDS

Tierra del Fuego

LEADING PRODUCTS

Alfalfa
Cattle
Corn
Gold
Meat
Oil
Sheep
Wheat

MOUNTAINS

Aconcagua
Aconquija
Andes

RIVERS

Parana
Pilcomayo
Plata, Rio de la
Uruguay
Vermejo

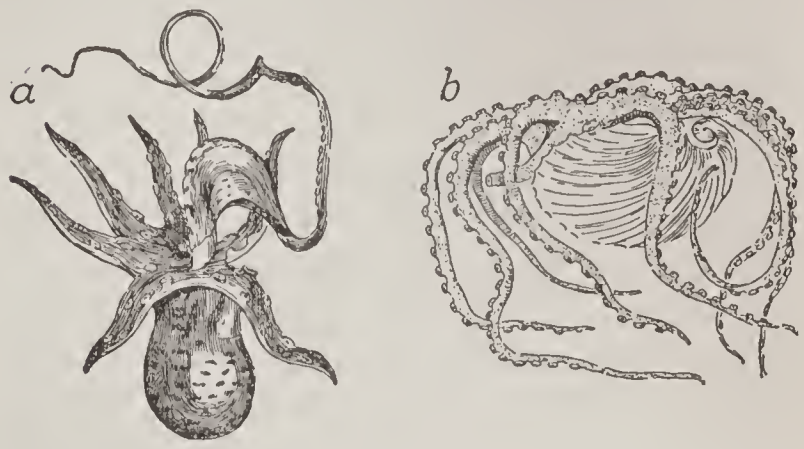
UNCLASSIFIED

Gauchos
Patagonia

Consult Boyce's *Illustrated South America; Handbook of the Argentine Republic* (Bulletin issued by the Pan-American Union, Washington, D. C.); Fraser's *The Amazing Argentine.*

AR'GON, a gas which is found in the atmosphere, of which it forms only a very small proportion, about eight-tenths of one per cent. It is a chemical element and its symbol is A. Its presence in the atmosphere was suspected for a long time, but it was discovered only in 1875 by Lord Rayleigh and Sir William Ramsay. It is a colorless and odorless gas and seems to possess no chemical properties by which it can unite with other substances; therefore, no compounds have been discovered. Argon has been reduced to a liquid and a solid. Four volumes of it dissolve in 100 volumes of water. See CHEMISTRY.

ARGONAUT, *ar' go nawt,* a small cuttlefish, named for the sailors on the *Argo* (see ARGONAUTS, below), because it was popularly supposed to sail on the surface of the sea with its two webbed arms for sails. The male is very inconspicuous—not more than an inch in length; but the female is eight or ten times as large and has a fluted, spiral shell, called the *boat.* This little animal is the *paper nautilus* of which poets have often written, and it is especially well known through Oliver Wendell Holmes's *The Chambered Nautilus.* In this poem, however, Holmes confused the chambered nautilus with this little argonaut, or *paper sailor,* for the latter has not a chambered shell and is not a true nautilus. Thus the lines on the "ship of pearl" which "sails the unfathomed main" apply to the legend regarding the argonaut while the rest of the poem refers to the real nautilus.



ARGONAUT

Illustration shows (a) male, (b) female. Though drawn nearly to same scale, the male is only about one-eighth the size of the female.

ARGONAUTS, *ar' go nawts,* the fabled heroes of Greece who sailed with Jason in the *Argo* in search of the Golden Fleece. Legend has it that long before the Trojan War, Aenos, king of Thessaly, became tired of ruling and gave up the throne to his brother Pelias, on condition that the latter should rule only until Jason, the son of Aenos, became of age. When Jason eventually demanded the crown of his uncle, Pelias pretended to comply, but suggested that Jason and his companions could gain great renown by going in search of the Golden Fleece, which was known to be in the distant land of Colchis, on the shores of the Euxine (Black) Sea.

Anxious above all things for glory, the young heroes set out on their voyage in the ship *Argo,* which had been made for them. Jason was the leader, but Orpheus, Castor and Pollux, Hercules and Theseus were fit companions for him. After many adventures they reached Colchis, where they learned that the Golden Fleece hung in the branches of a tree and was guarded by a dragon that never slept. Through the aid of Medea, a powerful sorceress, the daughter of the king of Colchis, a deep sleep was made to fall upon the dragon, and Jason captured the Golden Fleece and departed for Thessaly, taking Medea with him. This legend probably had its origin in some early voyage of discovery. See JASON; MEDEA.

AR'GUS, in Greek mythology, a fabulous creature known as the *all-seeing,* because he had 100 eyes. This monster was placed by

Juno to guard Io, whom she hated, but Mercury induced a deep sleep to fall upon him and then cut off his head. Juno then placed his eyes in the tail of her favorite bird, the peacock, where they may still be seen. The term "argus-eyed" is applied to one who is exceedingly watchful.

ARGYLL, *ar' gyle,* JOHN CAMPBELL, second duke of (1678-1743), Scotch statesman and general, whose habitual kindness and courtesy won for him the popular title, the *Good Duke of Argyll.* He was royal commissioner in 1705 to effect the union of Scotland and England, and was always a leader in Parliament. As a soldier, Argyll served with distinction under Marlborough at Ramillies, Oudenarde, Malplaquet and other battles, and to a remarkable degree won the affections of the soldiers under his command. His shifting political views, which he changed whenever a change would bring him some advantage, in turn won or lost the favor of the king, but he finally attained the rank of field-marshal. A monument to his memory was erected at Westminster Abbey, and his deeds have been described in the *Heart of Midlothian,* by Sir Walter Scott.

ARGYLL, JOHN DOUGLAS SUTHERLAND CAMPBELL, ninth duke of (1845-1914), an English statesman and author, better known, perhaps, as the MARQUIS OF LORNE, the title which he bore by courtesy until the death of his father, the eighth duke, in 1900. In 1868 he was sent to Parliament, where he represented Argyllshire for ten years. He married in 1871 the Princess Louise Alberta, fourth daughter of Queen Victoria. The Canadian province of Alberta was named for her. From 1878 to 1883 he was Governor-General of Canada, his administration being exceedingly popular; from 1895 to 1900 he was a leading Unionist member of the House of Commons. Among his writings are *The United States after the War, Imperial Federation, Psalms in English Verse, Life and Times of Queen Victoria, Life of Palmerston,* and his own reminiscences, *Pages from the Past.* He also wrote several books describing his travels, a grand opera, several dramas and numerous poems, one of the best of which is *Canada, a National Hymn.* It begins as follows:

NINTH DUKE OF ARGYLL
(Marquis of Lorne.)

From our Dominion never
  Take Thy protecting hand!
United, Lord, forever
  Keep Thou our fathers' land!
From where Atlantic terrors
  Our hardy seamen train,
To where the salt sea mirrors
  The vast Pacific claim.
Ay with her whose thunder
  Keeps world-watch with the hours,
Guard Freedom's home and wonder,
  This Canada of ours.

ARIADNE, *air i ad' ne,* in Greek mythology, a daughter of Minos, king of Crete. When Theseus came to Crete and undertook to slay the Minotaur Ariadne gave him a twist of thread, of which she held one end. This he unwound as he entered the labyrinth, and by following it back found his way out after his victory. He fled from the island secretly, taking her with him, but deserted her on the Isle of Naxos, where she was found and married by Bacchus. See LABYRINTH; MINOTAUR; THESEUS.

ARIADNE ON THE ISLE OF NAXOS
From the painting by Rae.

ARID, *air' id,* **REGION,** a dry area with no rainfall or with a quantity of rainfall so small that a good growth of vegetation cannot be sustained. The word *arid* literally means *dry,* or exhausted of moisture. A desert, therefore, is an arid region. The name is frequently applied to that portion of North America which does not have enough rainfall for the successful raising of crops. This region comprises most of the western plains, including parts of Alberta and Saskatchewan and the states of Montana, Wyoming, Colorado, Utah, Nevada, Arizona and New Mexico, the western portion of the Dakotas, Nebraska, Kansas, the northern part of Texas west of the 100th meridian and a portion of Southern California.

Another arid region, smaller in extent, is found in Oregon and the southeastern part of Washington, extending into Idaho. The area of the arid region of North America is nearly two million square miles, of which about three-fourths are in the United States. Large portions of this region, however, receive sufficient rainfall to support a growth of good grass for grazing purposes, and it is more accurate to call this a *semi-arid* region. In the arid region of North America, and in almost all similar sections in other parts of the world, the soil is fertile, and when supplied with water produces abundant crops. See DESERT; IRRIGATION; DRY-FARMING.

ARIES, *ay' ri eez,* the ram, the first sign of the zodiac and the name of a constellation. The zodiacal division of Aries includes the first 30° of the ecliptic from the vernal equinox, or the point at which the sun crosses the equator in the spring. The sun at the time of crossing is said to be "in the first of Aries," but owing to the forward and westward motion of the equinoxes the sun actually is in Pisces at the vernal equinox (see PRECESSION OF THE EQUINOXES). The symbol of Aries is ♈, representing the horns of a ram or the nose and eyebrows of the human face. See ZODIAC, for illustration.

ARISTA, *a rees' ta,* MARIANO (1802-1855), a Mexican general who ranks not lower than third among Mexico's great men, regarded by some as second to Porforio Diaz. He took part in the war that secured Mexican independence, and in 1836 was second in command to the dictator Santa Anna, whom he excelled in constructive ability. During the war between Mexico and the United States Arista led the Mexican forces at Palo Alto and Resaca de la Palma, and was badly defeated in both battles by General Zachary Taylor. In 1850 he became President of Mexico, but his term of office was a troubled one, and he resigned in 1853. Soon afterward he was banished by Santa Anna, who had stirred up a revolt against him. He died in exile in Spain.

ARISTIDES, *air is ti' deez* (about 550-467 B. C.), a celebrated Athenian statesman and military commander, of whom it is told that he was once approached by an ignorant citizen unknown to him, and asked to write the name Aristides on a shell. Since this was a vote for banishment, Aristides asked what his reason was for wishing to banish an innocent person, and the man replied, "It's that I am so tired of hearing him called *The Just.*"

At the time of the Persian invasion under Darius, Aristides was one of the leaders of the Athenians; it was owing to his influence that the chief command was given to Miltiades, instead of being changed daily among the ten generals, as had been customary. To this fact was due in great measure the important victory at Marathon (490). Shortly after this Aristides was appointed archon or chief magistrate, but his rival, Themistocles, managed to secure his banishment by declaring that he was becoming dangerous to the democracy (484). It was in connection with this incident that the above story is told. Such was his unselfish patriotism that during his exile he sought to unite the Grecian cities against the coming Persian invasion, and before the Battle of Salamis (480) went to Themistocles and gave him his hearty support. He helped to plan the engagement and himself took part in it, and afterward commanded the Athenian forces. Aristides was so poor at his death that he was buried at public cost; but from a grateful country his children received dowries and a landed estate.

ARISTOCRACY, *air is tok' ra si,* a form of government in which the power rests in the hands of a few citizens prominent for their wealth or family prestige, or both. The term literally means government by the best. It stands midway between an absolute monarchy, in which one man exercises supreme authority, and a democracy, in which authority is shared by all the citizens. In the Greek philosophy of government the aristocracy was the ideal form, for it was neither despotic nor ruled by the mob. Theoretically, the men best qualified governed in the interests of all the people. In practice, however, the governing classes frequently consulted only their own interests,

thus establishing an *oligarchy* (which see). Athens and Sparta at various times, and Rome for two centuries before the formation of the Empire, were true aristocracies. In modern use the word has a wider meaning, equivalent to the *best;* thus we speak of an aristocracy of brains, of wealth, and of birth. See GOVERNMENT.

ARISTOPHANES, *ar is tof' a neez* (444-380 B. C.), the greatest writer of comedy in ancient Athens. His plays were in poetry, and of the forty which he wrote, eleven have survived. These comedies give a picture of the political and social conditions of Athens in his time. He was not afraid to ridicule such well-known men as Cleon, Alcibiades and Socrates, though his later plays are less personal than the earlier ones.

Aristophanes was a master of language and rhythm, and his songs and chants show his richness of imagination. His plays are remarkable for wit, rollicking fun, originality and mocking satire. Of the plays that have come down to us the most important are *The Knights, The Clouds,* in which Socrates is ridiculed, *The Wasps, The Birds* and *The Frogs,* the latter a satire on Euripides.

ARISTOTLE, *air is tot' 'l,* (384-322 B. C.), the greatest of ancient philosophers, generally regarded as the wisest man Greece ever produced. He was born at Stagira, a Greek colony in Thrace, and there received his early education. At the age of seventeen he went to study at Athens, where he remained for twenty years. He was a favorite pupil of Plato, who called him "the intellect of his school." About 343 B. C. Aristotle removed to Pella, the capital of Macedonia, and became the teacher of Alexander the Great. After the conquest of Persia, Alexander presented him with a sum equal to nearly a million dollars, and aided his scientific researches greatly by sending him a specimen of any plant or animal unknown in Greece that was found on his expeditions. This friendship led the Athenians to accuse Aristotle of favoring Macedonia in the affairs involving the two countries, and he was forced to flee to the island of Euboea, where he died.

ARISTOTLE

While at Athens Aristotle taught in the Lyceum, a gymnasium near the city, and his school is sometimes referred to by this name, though more commonly called the *Peripatetic School.* This name, taken from the Greek word meaning *walk,* was given because Aristotle walked up and down in his garden while teaching.

Aristotle was the creator of natural science. He was the first to divide the animal kingdom into classes, and came near discovering the circulation of the blood. His moral and political theories, set forth in the *Ethics* and the *Politics,* give his ideals of government and a description of the model state. To him also is due the syllogism, the simplest form that an argument may assume, as in "All animals are mortal; I am an animal; therefore I am mortal"; and it was he who established the so-called "cosmological argument" for the existence of God. This is, in substance, that everything in the world has a fixed cause, and back of the long succession of causes there must be an infinite being, a first something, absolute reason, God.

Before the eleventh century Aristotle was but little known to the Christian world, although his writings were prized by the Arabians for three centuries prior to that time. For four centuries he remained the authority of the Christian thinkers, but gradually his teachings became distorted and misunderstood. With the revival of learning (see RENAISSANCE) his works were carefully studied and correctly interpreted, and their effect is felt in all modern philosophy, notably in Bacon, Kant, Spinoza and Descartes. Only portions of Aristotle's writings have come down to us. Of his preserved works the most important are *Logic, Rhetoric, Poetics, Physics, Metaphysics, Ethics, Psychology, Politics, History of Animals, Meteorology.* See PERIPATETIC SCHOOL OF PHILOSOPHY; PHILOSOPHY; PLATO. C.W.K.

ARITA, a town of Japan noted for its pottery works, which have been in existence since the sixteenth century. The porcelain produced there is highly esteemed for its artistic finish and durability, and is made of the white clay known as kaolin, extensive deposits of which are found in the vicinity. Arita is situated in the western part of the island of Kiushiu, about fifty-eight miles north of Nagasaki, with which it has railway connection. Its population is about 6,000.

ARITHMETIC. Why must we study arithmetic? Why does it hold an important place in the list of school studies? Investigations by teachers and business men have shown that there never before has been such widespread need of arithmetical knowledge, because there is no other subject that is so closely connected with every-day needs and because widening fields of labor demand more and more a practical understanding of *figuring,* or working with numbers and number relations.

What does the world demand of boys and girls at the age of fourteen, sixteen or eighteen who leave school to become workers? The cry from employers in every line of work is for employees with a good general knowledge of arithmetic. It cannot be too plainly stated that the young person going into the "working world" will have the best opportunity who carries with him a knowledge of arithmetic. It is the key to the ordinary problems which will confront him daily.

We must study arithmetic, then, because it is a very practical subject—indeed, the most practical branch in all school work. You may read somewhat haltingly and without true inflection; you may be pardoned for occasional errors in speech, but the exact science of numbers as developed in arithmetic demands accuracy and precision. This is the reason that dozens of pages in this set of books are devoted to a clear and intelligent explanation of every department of arithmetic.

Besides the practical value of the subject, there is an important *cultural* value, which, it is true, is of secondary importance, but yet worthy of attention. Both phases are discussed below.

The Practical Value of Arithmetic. As the years go by for the boy in the industrial world, he desires to advance, and father and mother earnestly share this ambition. According to their ability they have given him, during the years they have sent him to school, the tools he needs to work with. Sometimes it has been discovered that he is equipped but poorly and that he lacks some vital knowledge. He may have begun in the machine shop; in the laboratory of some large plant; in the office of an engineer, contractor, etc. He finds almost invariably that to get toward the top he must have more mathematics. If he has a good foundation in arithmetic he may easily take up algebra or geometry and so prepare to make headway in his work. For all mechanical work, all structural work, civil, mechanical, electrical, much mathematics is required. The laying out of streets, lots, farms, gardens, roads; the building of bridges, canals, railroads, sewers, sky-scrapers, subways, all require mathematics—to survey the ground, to experiment in strain and stress and thus suit material to the demands of the situation and avoid accident and loss; to insure safety of life and property; to estimate costs, and so on. Chemistry is making new and large demands upon mathematics. The boy who goes into a laboratory of a large manufacturing plant needs fair control of arithmetic—of common and decimal fractions, ratio, percentage—while he is doing the simple work of a novice working by formulas. For a few years he does this initial work, gets fair wages and feels successful. But soon he looks forward to advancement, to become a leader, a *maker* of formulas, not a *follower* only, and finds that to advance he must have more mathematics, and if he has had a good foundation in arithmetic he easily takes up the advanced work. Every mother should be proud to know that each hour she devotes at home guiding the uncertain steps of her children into the field of arithmetic she is making an investment that will return in later years a hundredfold.

Boys going to work in railroad yards, railroad offices, express offices, and so on, report that there is a very sharp demand upon them for clever manipulation of figures. They find the same if they enter one of many of the various departments of government works—

the water department, the department of public works, the department of health, the offices of the various inspectors, etc. The farmer boy, who will operate his own farm some day, ought to know how to reduce many of his problems to figures. Guesswork on the farm is expensive. How much stovewood is in that standing tree? How much lumber will be required for a corn crib to hold 500 bushels? How shall he prepare rations for farm stock to get best feeding results? Does his poultry pay a profit? How will he determine whether his neighbor with a silo has a financial advantage over him?

Some grocers own computing scales, which automatically show the value of a purchase. The boy in a less progressive store will find his chances of continued employment brighter and his work easier if he so commands mathematical knowledge that mentally he can solve his hundreds of problems daily. A stubby pencil and peevish, waiting customers seldom give the clerk serene and tranquil poise.

The growth of scientific investigation and the consequent keeping of statistics and setting forth to the public in literature the results of this varied investigation has enlarged the use of arithmetic and opened positions to boys and girls and men and women who need to be alert and capable in the use of figures. More and more are young people turning to civil service pursuits. That broad field is particularly inviting, but one will hardly get in and much less stay in without a good knowledge of the fundamentals which underlie arithmetic. For example, the department of health gathers extensive statistics from which it draws conclusions of incalculable value to physicians and to the public. Board of education census bureaus, bureaus of public welfare and public workers in sociology do extensive work in statistics. The water department must *figure* the capacity of pipes, the flow of water, the number of cubic yards of "dirt" to be excavated, the cost of material and labor for laying pipes, etc.

Government departments employ scores of thousands of clerks whose positions are secure as long as they are competent to perform their tasks—and there is need of simple arithmetic and quickness in applying it in nearly every office. Even the Department of State, given almost wholly to diplomatic affairs, demands mathematics in its consular reports. The Department of Agriculture, with its many bureaus, has large forces at work on statistics and percentages. The Bureau of Weights and Measures keep employed numbers of workers in simple arithmetical computations as well as in advanced mathematics. The employees of the Interstate Commerce Commission are largely occupied with figures. There is therefore a tremendous demand for arithmetic and more advanced mathematics. It would seem, therefore, as true quite beyond dispute that the science of numbers underlies conditions in every walk of life where people seek to earn their living. The demand appears where many of us least expect to find it.

At the present day the scientific trend of thought and the vast growth of industrial life are calling urgently for mathematics, *simple, accurate arithmetical computation,* as well as the most complex mathematical conclusions.

Boys and girls, therefore, who desire to be equipped well for the demands of industrial life, to fill satisfactorily the positions of beginners and business novices in the first months and years after leaving school, and to progress as the years go by and take leading places in this great complex industrial life, should go out from school (if they must leave early) with a good knowledge of arithmetic; they must work in addition, multiplication, subtraction and division with assurance, accuracy and some fair degree of rapidity; they must work easily with common fractions, and possess a knowledge of how to attack large ones if they meet them; the decimal fractions must be, in their hand, a tool in perfect control. (The decimal fraction is supplanting the common fraction in all scientific work, investigation and experiment, and very largely in industrial work.) They must be familiar with ratio and percentage which forms a great part of the arithmetic of the commercial as well as scientific computations; they must have at hand the means of estimating and measuring accurately, and lastly they must be prepared to go on with advanced work in mathematics.

Culture Value of Arithmetic. Arithmetic is a logical exercise which strengthens and invigorates the mind. The student may reason clearly and demonstrate to his perfect satisfaction all arithmetical relations, and need not accept them on tradition or on the authority of his text-books. Very early in the study the student finds laws immutable with which he must work in accord; for example, he finds by experiment alone or with his class that the area of a circle is 3.1416 times as great as the square built upon the radius of that

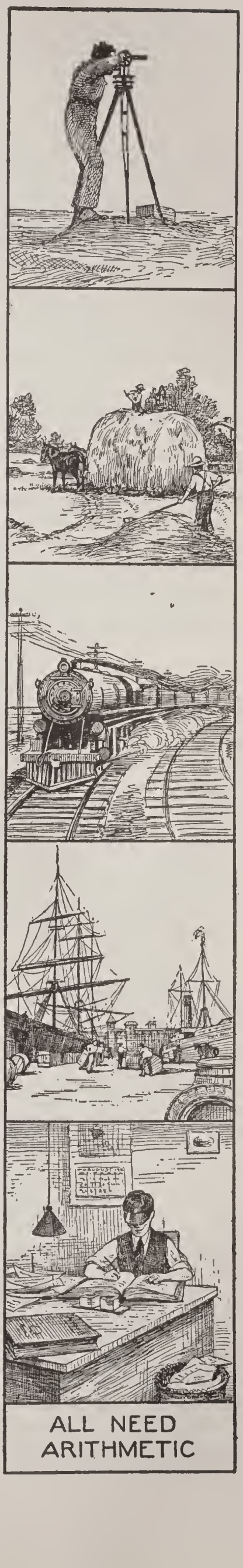
circle. He cannot change this, nor ignore it; it is a law, a truth. He learns to respect law, to reason in accordance with it not only in the class-room but outside of it. This cultural value comes from arithmetic only in the degree the student is allowed to experiment and investigate and discover for himself the arithmetical truths through his own solutions and methods.

The schools are coming to allow more freedom in this direction than they formerly did. Teachers are letting students experiment with problems, are allowing and encouraging individual research for material and method of solution even in the early grades. Students are consulting persons in the business world and in the mechanical and technical industries and bringing back into class such information as they have gained outside by observation and inquiry. The teachers urge students to investigate as far as they can personally, and then consult with persons who have special and expert knowledge upon the *arithmetical* situation under consideration in the class-room. This tends to socialize arithmetic by bringing together persons interested in the same subject. It gives the student respect for parent, neighbor or friend who knows expertly the thing which he is studying, and in turn the outside people come to understand and respect the school.

Steps in the Study of Arithmetic

To outline a course of study which may be applied to the work in all schools is a difficult task. There has never been uniformity in grading, as parents realize who move with their children from town to town. The child in fifth grade in a village may be doing practically the same work as the city child in fourth grade. The course of study as outlined by school authorities in one state or province is not likely to be in accord with courses prescribed in other sections. For the United States the Bureau of Education at Washington was employed in 1916 on the task of preparing a uniform course of study to recommend for acceptance by all the states. No date was announced for its publication.

Accepting the conclusions of skilled educators, the following may be considered a fairly accurate survey of the work in arithmetic, grade by grade, for the first eight grades. Beyond the latter year, usually, no arithmetic



is taught. It is important that articles in these volumes be referred to, where such suggestions appear, for under those titles are given many methods to be employed in teaching:

FIRST YEAR

Numerical Expression. Writing and reading of Arabic numbers to 100; Roman numerals from I to XII; the signs +, −, ×, ÷, =.

Notation and Numeration. Count by 1's and 10's to 100; numbering groups of objects without counting; addition, subtraction, multiplication and division with numbers to 10, using objects for illustration. See NOTATION; *Addition,* etc.

Measuring. Teach ideas of size, form, direction.

Fractions. Deal with halves, thirds, fourths; with problems such as ½ of 2, 4, 6, 8, 10; ⅓ of 3, 6, 9; ¼ of 4, 8, etc.

Denominate Numbers. Familiarize pupils with values of cent, nickel, dime, day, week, pint, quart. Do not reach numbers above 10.

Practical Applications. Keep everything within the children's experience. Problems relating to things in which they have an interest will bring instant response. Two yards of silk mean less than two dolls' dresses; two glass marbles possess more meaning than two bushels of potatoes.

SECOND YEAR

Oral and Written Expression. The reading and writing of numbers below 1,000 and of all language forms used to state the relations of numbers expressed in the signs +, −, ×, ÷, =, $, ¢; including Roman numerals to L, if the reading lessons are so numbered; simple work involving the expression of dollars and cents; the reading and writing of time from the clock.

Notation and Numeration. The addition and subtraction of numbers not exceeding three orders. See NOTATION.

The building and learning of the multiplication tables from 1 to 5 inclusive; aiding the work in tables by counting by 2's, 3's, 4's and 5's.

Simple combinations in multiplication and division in connection with tables. The comparing of numbers.

Fractions. Review fractions learned in the first year and deal with ⅙.

Denominate Numbers. The learning of the units in measure, time and money, such as inch, foot, yard, pint, quart, peck, degrees of heat; fractions of hour and minute; cent, nickel, dime, quarter, half-dollar and dollar; in all cases using objective material such as coins, measures, the clock and thermometer. See DENOMINATE NUMBERS.

Measuring. By means of foot-rule, yardstick and other objects, have the pupils measure length of blackboards, window-sills, paper or parts of these objects. Simple work in area, using rectangles and triangles of folded paper made by the pupils.

Practical Problems. At this age the pupils have begun to develop the spirit of competition with their classmates and a comparison of the weight and height of the children in the room is interesting to them.

In measuring Charles, Alice and Mary we found that Charles was 4 ft. 2 in. tall, Alice was 3 ft. 5 in. tall and Mary was 3 ft. 8 in. tall. Who was the shortest? How much taller was Charles than Mary?

Have the children suggest original problems like the above, which involve but one step.

Problems are made much easier to the pupils if they deal with familiar and interesting objects, as the following, correlated with their nature study.

The rose bush we planted in the school yard grew 1½ inches last year, and in measuring it this year, we find that it has grown 2¾ inches higher. How much less did it grow last year than this?

Real Problems for Oral Work. I have six apples and three bags. How shall I find how many apples I should put into each bag?

The picture near the clock is square. If we know the length of one side of it, how can we find the distance around it? Outline the picture and explain.

THIRD YEAR

Oral and Written Expression. The reading and writing of Arabic numerals to 10,000 and of the Roman numerals to C; the rapid reading and writing of fractions and of sums of money expressed in dollars and cents.

Notation and Numeration. The rapid addition and subtraction of simple combinations. See NOTATION.

A review of the multiplication tables through 10 and the learning of the tables of 11 and 12; practice in counting forwards and backwards by 2's, 3's, 4's and 5's.

The thorough mastery of the multiplication table to 10 × 10 and of division by numbers through 10. The comparing of numbers and quantities continued. See ADDITION; SUBTRACTION; MULTIPLICATION; DIVISION.

Fractions. Addition work in the fractions ½, ¼, ⅛, ⅓ and ⅙.

Denominate Numbers. Continue the work in denominate numbers begun in the first and second years with drill in changing denominate numbers to the new smaller or larger units; as the number of quarts in 12 gallons; the number of inches in 3 feet; the number of minutes in 2 hours, etc.

Additional practice in reading time from the clock. See DENOMINATE NUMBERS.

Measuring. Continue the measurement of familiar objects and the working of practical problems in measurement.

Practical Problems. Let the problems deal with objects full of meaning and interest to the children.

Real problems in comparison such as: If 3 tops cost 6 cents, what is the cost of 6 tops? Let the pupil compare 3 and 6 before proceeding to the second step of the problem. Many such comparisons may be made.

Henry and John kept a lemonade stand in their front yard. They made 3 gallons, but in pouring it into the pitcher, spilled 1 quart. They sold it at 6 cents a quart; how much money did they receive? The lemonade cost them 1 cent a half-pint glass; what was their gain?

FOURTH YEAR

Oral and Written Expression. The reading and writing of numbers below 1,000,000 and Roman numerals to M; the reading and writing of decimals of two orders, including dollars expressed decimally.

Notation and Numeration. Drill for rapidity and exactness in simple addition, subtraction, multiplication and division. See NOTATION. Written work in multiplication and division of numbers of 2 orders. Simple problems in "long" division and "long" multiplication. Further comparison of numbers and quantities. See MULTIPLICATION; DIVISION.

Fractions. Develop fundamental idea or meaning of fractions. Simple operations in addition, subtraction and comparison of fractions; changing of fractions to whole or mixed numbers and back again. See FRACTIONS.

Denominate Numbers. Review of denominate numbers learned in previous grades and in addition, the units of weight, square measure and cubic measure; problems in denominate numbers involving all the fundamental operations. See DENOMINATE NUMBERS.

Measuring. Continue and extend the exercise in the measurement of familiar objects, including drawing and construction work.

Practical Problems. Find dimensions of your desk top in feet. What area of space is occupied by your Readers, when placed flat upon your desk?

The work may be made interesting by correlating the problems with other subjects such as nature study, as in the following example: there are 6 oak trees, 2 maple trees and 4 elm trees in the school yard; what proportion of the trees are oaks? What proportion maples? What proportion elms?

FIFTH YEAR

Varied Processes. Review of addition, subtraction, multiplication and division with special emphasis on division; oral and written drill on numbers of nine orders, and all Roman numerals; the comparison of quantities and ratio of numbers continued; sight factoring of simple combinations.

Fractions. Work in small fractions involving the four fundamental operations. The use of cancellation in the reduction and multiplication of fractions. See CANCELLATION.

The decimal method of expressing common fractions; addition, subtraction, multiplication and division of decimal fractions to two places. The multiplication and division of decimal fractions by 10,000 or 1,000, by moving the decimal point. See FRACTIONS.

Mensuration. The actual measurement of areas, surface, perimeters and volume and the use of these measurements in problems; to be used also with fractions. See MENSURATION.

Denominate Numbers. Problems involving the use of units of length, surface, volume, weight, capacity and time. See DENOMINATE NUMBERS.

Practical Problems. The application of the processes of addition, subtraction, multiplication and division in fractions and denominate numbers, in concrete problems based on subjects of interest to or within the experience of the pupils; the form of simple bills, how to foot and balance them. Let the pupil tell how problems may be solved without going through the actual work or give the approximate answer before solving.

SIXTH YEAR

Varied Processes. Review of fundamentals, short cuts and easy methods in the calculation of interest; tests of divisibility (by 2, 5, 3, 9); multiplication and factoring of fractions and mixed numbers. The equation.

Fractions. Decimal expression of fractions and percentage in drill; in business problems. See FRACTIONS.

Mensuration. The measurement of larger rectangular areas using larger units, such as the rod; measurement of rectangular and triangular solids. See MENSURATION; TRIANGLE; SQUARE; etc.

Denominate Numbers. The reduction of denominate units in all tables learned in the previous grades; drill in larger units of measure, as rod, mile, cord, etc., including a generous number of concrete examples and problems. See DENOMINATE NUMBERS.

Practical Problems. Let the pupils make up problems in fencing, flooring, painting and papering; excavation problems to find the volume of prisms and cubes; problems using current prices and dealing with percentage, profit, loss and simple interest.

SEVENTH YEAR

Varied Processes. Review of per cent and drill in short method of rapid calculations; special emphasis on the statement of problems and equations. See PERCENTAGE; INTEREST.

Fractions. A review and application of all processes in fractions in both oral and written work. See FRACTIONS.

Mensuration. The practical application of measurement of lines, quadrilaterals, triangles, solids, circles and cylinders, as in problems in the measurement of land, lumber, the capacity of barrels, tanks, etc. See MENSURATION; TRIANGLE; etc.

Denominate Numbers. Use of surface and cubic measure; comparison and reduction of foreign and United States money. See SQUARE MEASURE; CUBIC MEASURE.

Practical Problems. Real problems applying measurement, per cent and business forms to subjects associated with the home and school life and of interest to the pupils, as: problems of hired farm labor, acreage of ground, balance of rations for cattle, etc.

EIGHTH YEAR

Varied Processes. Continue and extend study of ratio and proportion; principles of square root.

Fractions. Review with special emphasis on decimal fractions, percentage and other business uses. See FRACTIONS.

Mensuration. Drill for rapidity and exactness in mensuration work of seventh grade.

Denominate Numbers. Extend work to include units of metric system, longitude and standard time. See LONGITUDE AND TIME; STANDARD; METRIC SYSTEM.

Practical Problems. Drill pupils on simple, modern, business forms such as: notes, checks, money orders, receipts, drafts, etc.; taxes, insurance, commercial discount, stocks and bonds. See DISCOUNT; INSURANCE; TAXES; CHECKS; NOTES; DRAFTS, and the like.

History of Arithmetic

Arithmetic is the science of number, the scientific formulation of number relations. The savage formulates his number concepts in a crude way, using his fingers as counters and when all are used says "a hand," meaning 5, "two hands," meaning 10.

FINGERS AS COUNTERS

In Madagascar a chief has been observed counting his army as follows: The soldiers pass before the chief and a pebble is dropped as a counter as each one passes. When ten pebbles have been dropped, one pebble is set aside and a new pile begun, and again when the pile has grown to ten, one is set aside and so on until ten have been set aside, when one is set aside to mean one hundred. The Aztecs indicated 10 by a picture of the "upper half of man" and their word for 10 was *matlactli*, or *hand-half*. Some Indian tribes in the North express twenty thus: "A man come to an end." Another tribe calls it "One Indian ended."

THE AZTEC "TEN"

These few illustrations taken from thousands that travelers have brought to us from among the tribes indicate the attempt of the low races to formulate number relations so that they may have some control over this important element of number in the life about them by which they count and to estimate their possessions and carry on trade and compare the wealth and strength of different tribes. The same *need* that leads to this crude formulation on the part of the savage leads to the finer formulation and study of arithmetic as it is found among the more civilized peoples of the world, and indeed largely to our study of it today. Of course the culture value of arithmetic is more or less to the front in the higher civilization, but emphasis on the culture value is much criticized; especially at the present time when technical and vocational work is attracting the attention and receiving the approval of a large part of schoolmen and laymen, there is a tendency to teach arithmetic for its utilitarian value.

INDICATING "TWENTY"

Far back in the centuries we find it taught in the schools of the far East only for its utility, and therefore only those parts of it that were useful to the people and answered their vital needs were taught. Among the great traders of Southwestern Asia, the Phoenicians, Babylonians and others, we find that arithmetic was taught extensively, as is seen by the tablets found by excavation in that part of the world. The tablets show comprehensive bank accounts, and some recently found show work of school children. Among some of the Semitic people arithmetic occupied from one-third to one-half of all the school time during the years corresponding to our later grade and high school years. In the commercial cities arithmetic was taught entirely for its utility. Italy as a commercial nation gave to the world mercantile arithmetic. During the time of the Hanseatic League the merchants throughout the commercial cities and all along the routes of trade demanded that the arithmetic of trade and commerce be taught, and when the products of the church school did not satisfy them they set up schools of their own for the study of arithmetic under control of a Rechenmeister, who was usually the city sealer of weights and measures. Indeed, arithmetic was so com-

OUTLINE OF DEPARTMENTS OF ARITHMETIC

I. Notation and Numeration

(1) Arabic numbers
(2) Roman numbers
(3) Notation and numeration of money
(4) Use of arithmetical signs

II. Basic Proeesses

(1) Addition
(2) Subtraction
(3) Multiplication
(4) Division

III. Common Fraetions

(1) Notation and numeration of fractions
(2) Reduction
(3) Addition of fractions
(4) Subtraction of fractions
(5) Multiplication of fractions
(6) Division of fractions
(7) Complex fractions

IV. Factors and Divisors

(1) Tests of divisibility
(2) Factoring
(3) Cancellation
(4) Greatest Common Divisor
(5) Least Common Multiple

V. Deeimal Fraetions

(1) Notation and numeration of decimals
(2) Reduction
(3) Addition of decimals
(4) Subtraction of decimals
(5) Multiplication of decimals
(6) Division of decimals

VI. Denominate Numbers

(1) Measure
  (a) Of value
  (b) Of weight
  (c) Of length
  (d) Of surface
  (e) Of volume
  (f) Of capacity
  (g) Of time
(2) Reduction
(3) Addition
(4) Subtraction
(5) Multiplication
(6) Division
(7) Longitude and time

VII. Determination of Areas and Volumes

(1) Angular measure
(2) Area of surfaces
(3) Volume of solids
(4) Practical measurements
  (a) Roofing and flooring
  (b) Plastering and painting
  (c) Masonry
  (d) Lumber measure
  (e) Tanks and bins

VIII. Pereentage

(1) Principles
(2) Applications
  (a) Profit and loss
  (b) Commission
  (c) Discount
  (d) Taxes
  (e) Insurance
  (f) Interest
    1. Simple
    2. Compound
  (g) Promissory notes
  (h) Exchange
    1. Domestic
    2. Foreign
  (i) Stocks and bonds

IX. Ratio and Proportion

(1) Ratio
(2) Simple proportion
(3) Partnership

X. Powers and Roots

(1) Involution
  (a) The square of numbers
  (b) The cube of numbers
(2) Evolution
  (a) Square root
  (b) Cube root

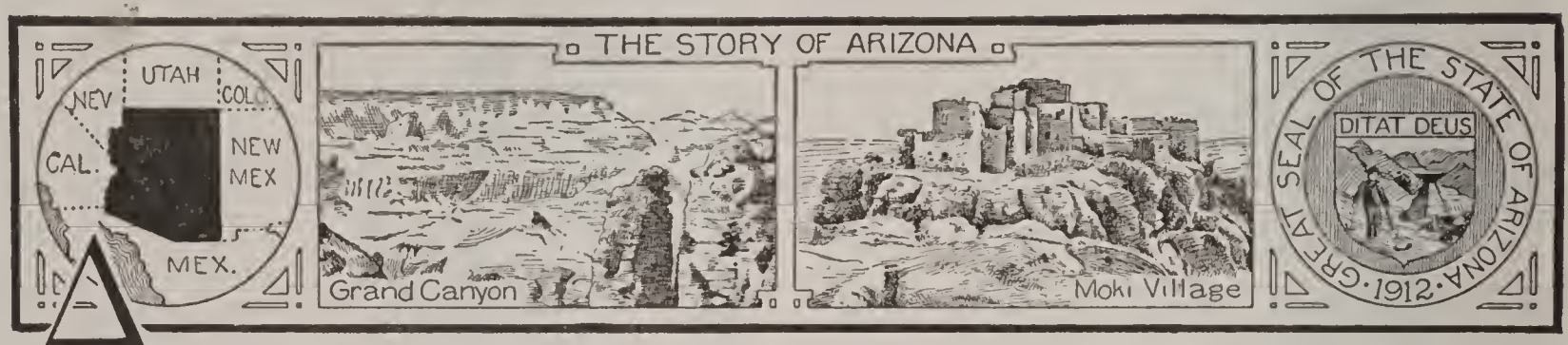
pletely dominated by commerce that it was no longer mentioned in the curricula of even the best schools.

Among the Romans and the Greeks we find some plea for the study of arithmetic for its culture value. Plato, Aristotle and Pythagoras all set value upon it as a cultural subject. Plato says, "It awakens the soul," Pythagoras places it with gymnastics and music as the three great educational subjects. He names the subjects in the order—gymnastics, music and mathematics. "By the first the pupil was strengthened; by the second, purified; and by the third, perfected and made ready for the society of the gods." A.H.

Consult any school-book publishing firm for arithmetic texts.

A Course in Arithmetic. The following articles in these volumes, if studied in connection with the above, will serve as a basis for a complete course in arithmetic:

Addition
Angle
Arabic Numerals
Area
Cancellation
Circle
Cone
Cube
Cube Root
Cylinder
Decimal Fraction
Degree
Denominate Numbers
Digit
Divisibility of Numbers
Evolution
Factoring
Fractions
Greatest Common Divisor
Insurance
Interest
Involution
Least Common Multiple
Longitude and Time
Mensuration
Metric System
Multiplication
Notation and Numeration
Number
Percentage
Polygon
Prism
Proportion
Pyramid
Quadrilateral
Ratio
Rectangle
Rhombus
Roman Numerals
Root
Sphere
Square
Square Measure
Square Root
Subtraction
Taxes
Trapezium
Triangle
Unit
Weights and Measures
Zero



ARIZONA, *air i zo' nah,* the newest state in the American Union, one of the great states of the plateau section. The name is variously interpreted as being Spanish for *arid zone* or Indian for *few springs,* but in either case it emphasizes the dryness of this state, which has but 146 square miles under water. Its area of 113,956 square miles makes it fifth in the Union in point of size, but in population it ranks forty-fifth, only Delaware, Nevada and Wyoming having fewer than its 204,354 inhabitants (in 1910). It averages but 1.8 people to the square mile. The New England states, which have a combined area of little more than half that of Arizona, have a population more than thirty times as great.

The People. Since 1870, when it contained but 9,658 people, exclusive of Indians, Arizona has had a steady and rapid but not a phenomenal growth. The largest growth in numbers, though not in percentage, for any decade was between 1900 and 1910, when the population increased from 122,931 to 204,354, a gain of about 66 per cent. Of the population in 1920, numbering 333,273, 291,449 were white, 32,989 were Indians, and the remainder were negroes, Chinese and Japanese. There are comparatively few Europeans within the borders of the state, but the Mexicans are numerous, comprising one-fourth of the entire population.

Almost seventy per cent of the inhabitants live in the small towns or rural districts, and only 63,260 in the cities. The latter, however, are growing, some of them very rapidly. The most important cities are Phoenix, the capital; Tucson, Bisbee, Douglas, Globe and Prescott. The more important of these are described in their places in these volumes.

Indians. The number of Indians in the state remains fairly steadfast, but shows a slight inclination to increase. All of them except a few hundred live in rural districts, chiefly on government reservations, and their flat, quaint adobe villages are pointed out to travelers who pass through these sections on the trains. More than half of the Indian inhabitants of Arizona are Navajo, who numbered about 16,000 at the last census. Their reservation is in the northeast corner of the state, and has attracted more attention than most Indian colonies, because of the famous Navajo blankets which are manufactured there. South of the Navajo live the Hopi or Moki Indians, little more than one-tenth as numerous as their northern neighbors. They have aroused considerable interest, however, because of the strictness with which they have preserved the old customs followed before the coming of the white man. The Apache and Mohave tribes are also of importance. All the Indians have improved in recent years in their manner of life. See description of each Indian tribe under its title.

Position and Physical Features. Arizona is one of the far Southwestern states, and has Mexico as its southern boundary. To the east is New Mexico, to the north Utah, and to the west Nevada and California. From these latter states it is separated by the Colorado River.

Detached mountains extend across the state in a general northwest-southeast direction and divide it into two principal physical regions of almost equal area—a northwestern plateau and a southwestern lowland section. The plateau, which has an average elevation of 5,000 feet, is in no sense a table-land, but has a highly-diversified surface of hills and deep-cut canyons. Through these in former times great rivers must have flowed, for only streams of considerable size flowing for a long time could have carved these deep chasms in the solid rock. To-day these rivers, with the exception of the Colorado, the most important river of the state, are mostly dry or flow only during the brief rainy seasons, but far below the surface of many of them is a regular flow of water which may be drawn out by pumping and used for irrigation.

The lower, southwestern section has a distinct slope from the mountain ranges, which divide it from the plateau to the Gila River, a slow, shallow stream flowing to the Colorado. This latter river drains the entire state into the Gulf of California. The lowland is not an actual plain, but is broken everywhere by short, isolated chains of mountains, which rise abruptly from the level surface. Here and there shallow tributaries of the Gila find their way among the buttes and mesas, but these are dry for a large part of the year.

The southern mountains are flat-topped and of no great height, but in the north there are lofty, outstanding peaks. Of these a number are over 10,000 feet high, and one, Mount Humphreys, an old volcanic peak, is 12,794 feet.

Scenic Wonders. In the northwestern part of the state there is to be seen the most marvelous river gorge in the world—the Grand Canyon of the Colorado, described elsewhere in these volumes. This formation, wrought by the busy river through the ages, is no more remarkable for its steep cliffs and the tumbling river in its narrow bed than for the wealth of brilliant coloring which glows in its rocks. Had Arizona nothing to offer to the visitor but this one sight, it would well repay a journey across the continent. But there are other wonders no less noteworthy in their way. In the north-central part of the state, to either side of the Colorado River, stretches the Painted Desert, "the most alluring desert in the world," as one distinguished traveler has called it. Pink, blue, yellow, white, brown and red are its sands, its clays and its rocky ledges, and all the colors have an especial brightness in the clear air and steady sunshine.

To the northeast, in Navajo County, near Holbrook, is one of the strangest forests in the

ARIZONA

Map shows boundaries, principal rivers, location of important minerals, principal cities, the Roosevelt Dam, petrified forest and highest point of land in the state.

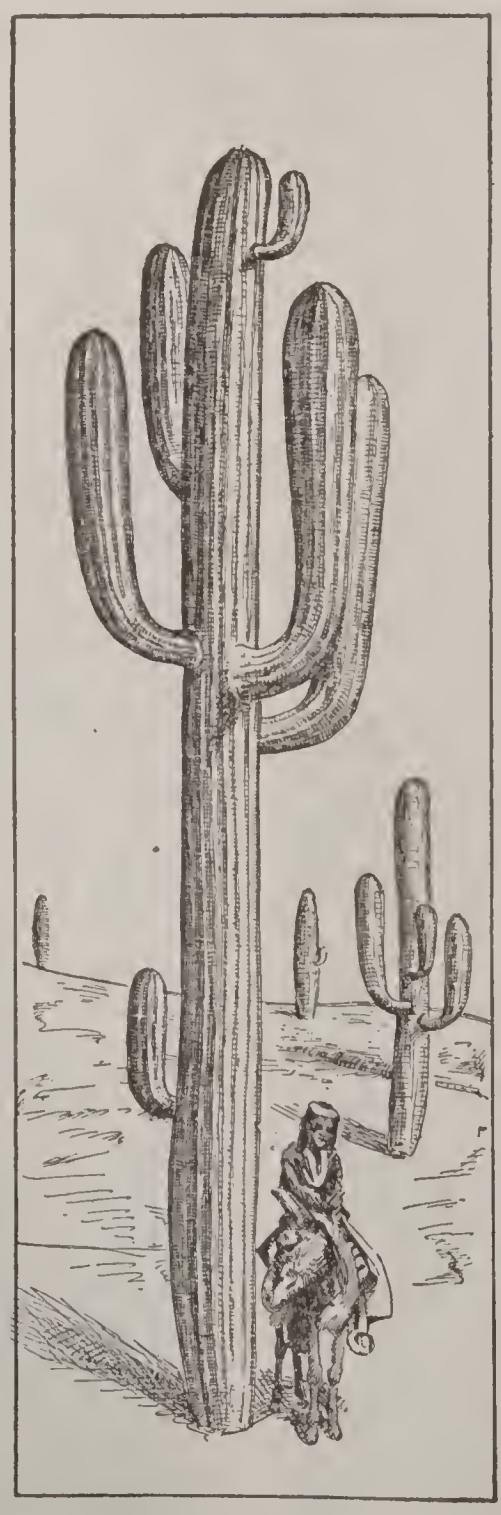
world—a forest of stone. The trees, some of which are fifty feet long and from four to five feet in diameter, are not standing, but lie on the ground, for the most part at the foot of the mesas in which they were earlier embedded. Every little particle of the wood has been replaced by a particle of silica, and the veins and markings all show perfectly. But the coloring in these agate, jasper and chalcedony logs is far more varied than that of the living wood, and enterprising visitors were not long in finding that the stone when polished could be used for all the purposes for which onyx or tinted marble is commonly employed. Great sections were removed, and it became evident that this wonderful formation would in time be entirely destroyed. The United States government, therefore, determined to save it, and made of it a forest reserve of a new type—a fossil forest reserve.

Climate and Vegetation. No part of the United States has more sunshine than has

Arizona, 292 days out of each year, on an average, being clear. To a traveler from the Eastern states who reaches Arizona on a sunshiny day it seems that he has never seen nor felt sunshine before, so intense is the glow. The northern plateau section has an average temperature of about 48°, which is approximately that of New York, but the extremes of heat and cold are not present. Particularly delightful is this high region during the summer. On the southern lowland the average annual temperature is about 68° but with a summer extreme of 130°. Yuma, at the junction of the Gila and Colorado rivers, is the hottest city in the United States, and one of the hottest in the world. The dryness of the air, however, makes the great heat of the deserts endurable. For Arizona is very dry in almost every section; only in a few mountain districts is there a fair rainfall. The northern plateaus have about twenty inches a year, but in the southern portion five inches is a common yearly average. This dryness of the air makes Arizona one of the most healthful regions of the United States, and of recent years it has become a favorite health resort, especially for people with any affection of the lungs.

Everywhere the vegetation shows the great need of water. In the mountains, to be sure, there are forests of oak, cedar, pine, fir and spruce, and the Coconino forest, 6,000 square miles in extent, is one of the very largest unbroken pine forests in the United States. In most places, however, desert conditions prevail, and little grows except sage brush, bunch grass, various species of cactus, the mesquite, and the ever-present yucca. After the summer rains grass springs up over much of the mesa land, and furnishes pasturage for stock.

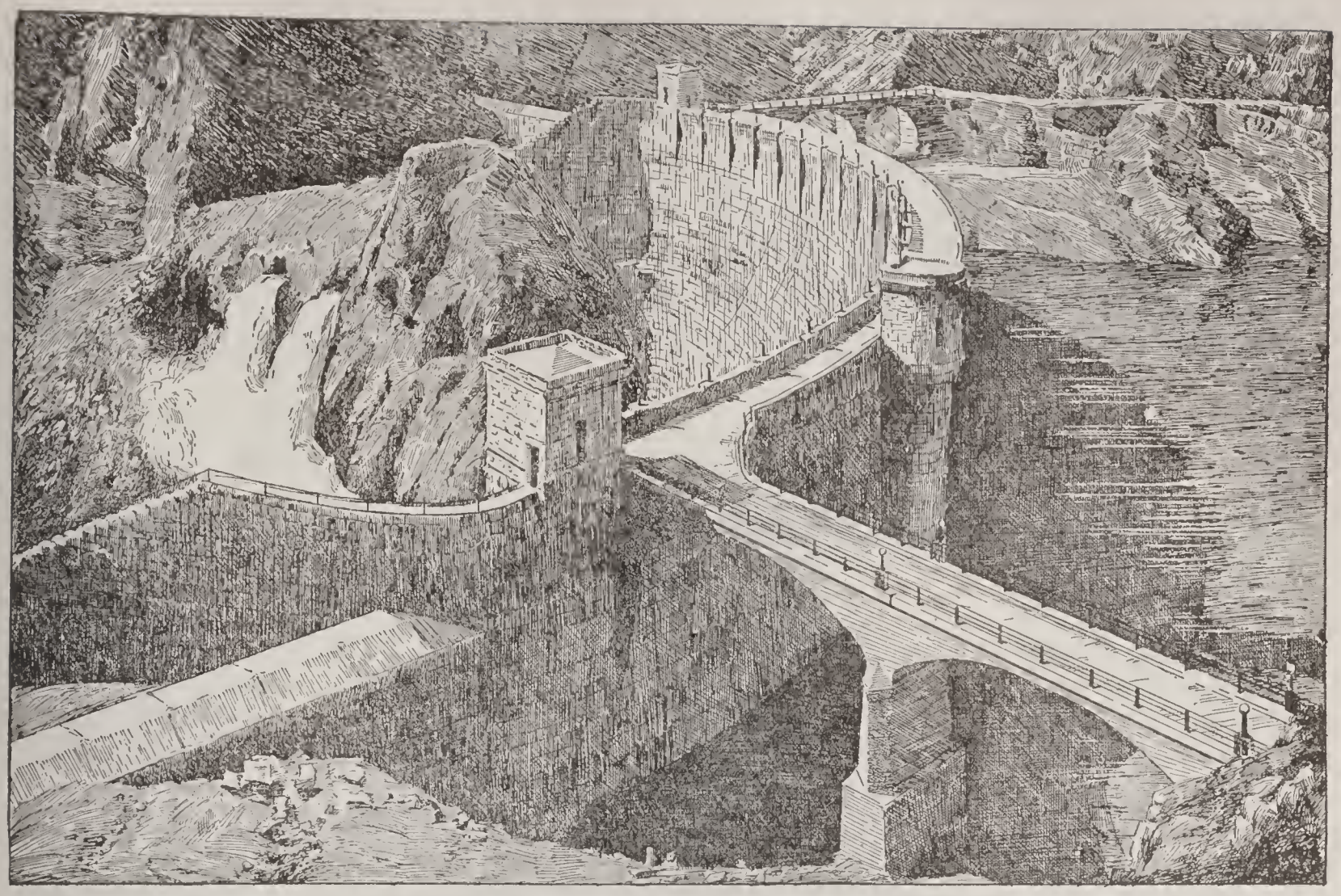
Agriculture. The lack of moisture has kept Arizona thus far from becoming prominent as an agricultural state, for without irrigation practically nothing will grow, and water has been very hard to obtain. In 1910 only 1.7 per cent of the land was under cultivation, and of this 350,173 acres, over ninety per cent, was irrigated. The small irrigation schemes, of which there were over 1,000 in various parts of the state, had proved that the valley lands were fertile and could be made very productive, and the Federal government determined upon a gigantic scheme—the so-called Salt River Project, or Roosevelt Dam and Irrigation Project (see IRRIGATION). The great reservoir, which was completed in 1911 and dedicated in March of that year by Theodore Roosevelt, is large enough to contain over 1,000,000 acre-feet of water, or water enough to cover that number of acres one foot deep. In the spring of 1914 this artificial lake was less than one-third full, but within a year the amount of water had increased to the point when it became evident that Salt River Valley need fear no lack of moisture. More than 200,000 acres of land will be reclaimed by this mighty project.



GIANT CACTUS

At Yuma, where the Gila River joins the Colorado, another great irrigation scheme has been put into effect. It is estimated that about 100,000 acres of the rich river-valley soil will be rendered capable of cultivation by the waters stored behind the big weir dam. A part of this reclaimed land is in California, but the larger part is in Yuma County, Arizona.

By far the most important crop of the state is hay, including forage plants of all sorts, and of these the most valuable is alfalfa. Three, five or even more crops of this are cut each year, and the total yield approximates 500,000 tons. In no section of the country is the production of hay per acre higher than in Arizona. Grains, potatoes and sugar beets are also grown, and experiments seem to prove that Egyptian cotton can be successfully produced in certain sections. Orchard crops, including apples, pears, peaches, grapes, olives, lemons, oranges and figs, do well and will probably in time come to rank among the important crops of the state, and strawberries are grown in some sections. In the neighborhood of Yuma dates



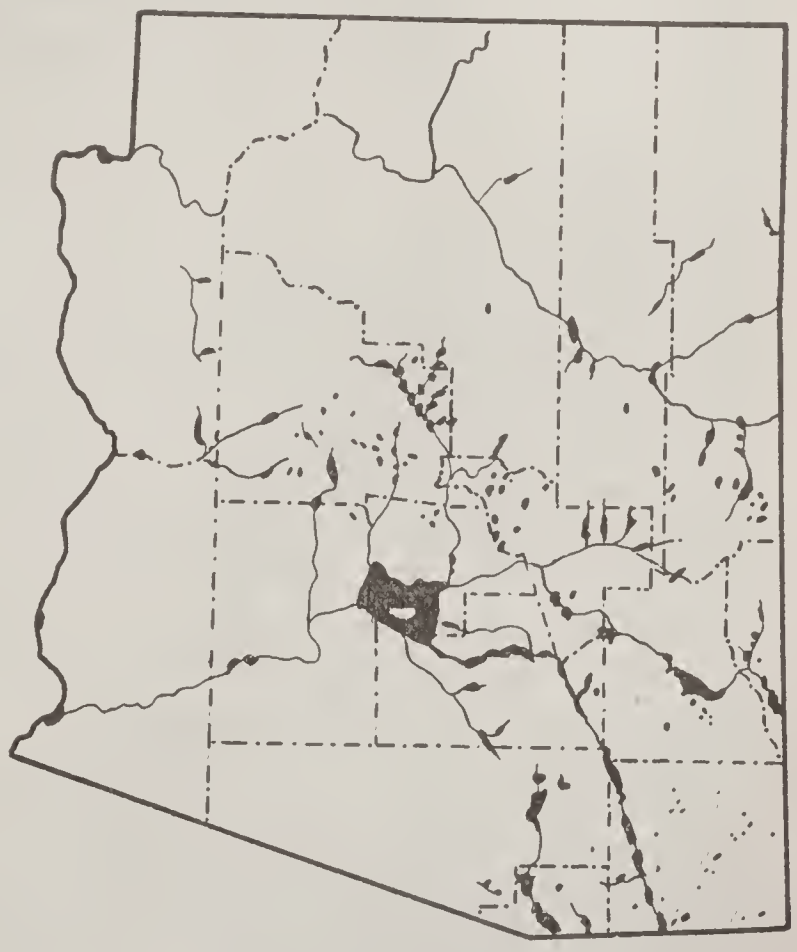
THE GREAT ROOSEVELT DAM

The base of the dam covers an acre of ground, and the height is 284 feet. At the top, from bank to bank, it is 1080 feet long and forms a fine driveway.

have been planted, and it is believed that this useful fruit can be grown in parts of the state which had been considered too alkaline for agriculture of any sort.

Stock-Raising. This is the more important phase of agriculture in Arizona, for much of the land which is too dry for the production of crops has a fine growth of grasses, some of which seem to be remarkably independent of moisture conditions. Thus some of the most typical of the great western cattle ranches are in Arizona, chiefly in the northern plateau region. Most of the cattle are grown for market and not for dairy purposes. Sheep-raising is increasingly important, there being over a million and a half of sheep on the ranges, and in production of wool Arizona is among the first dozen states. With the growth of irrigation projects the cattle industry is certain to decline as agriculture increases, but the change will be slow.

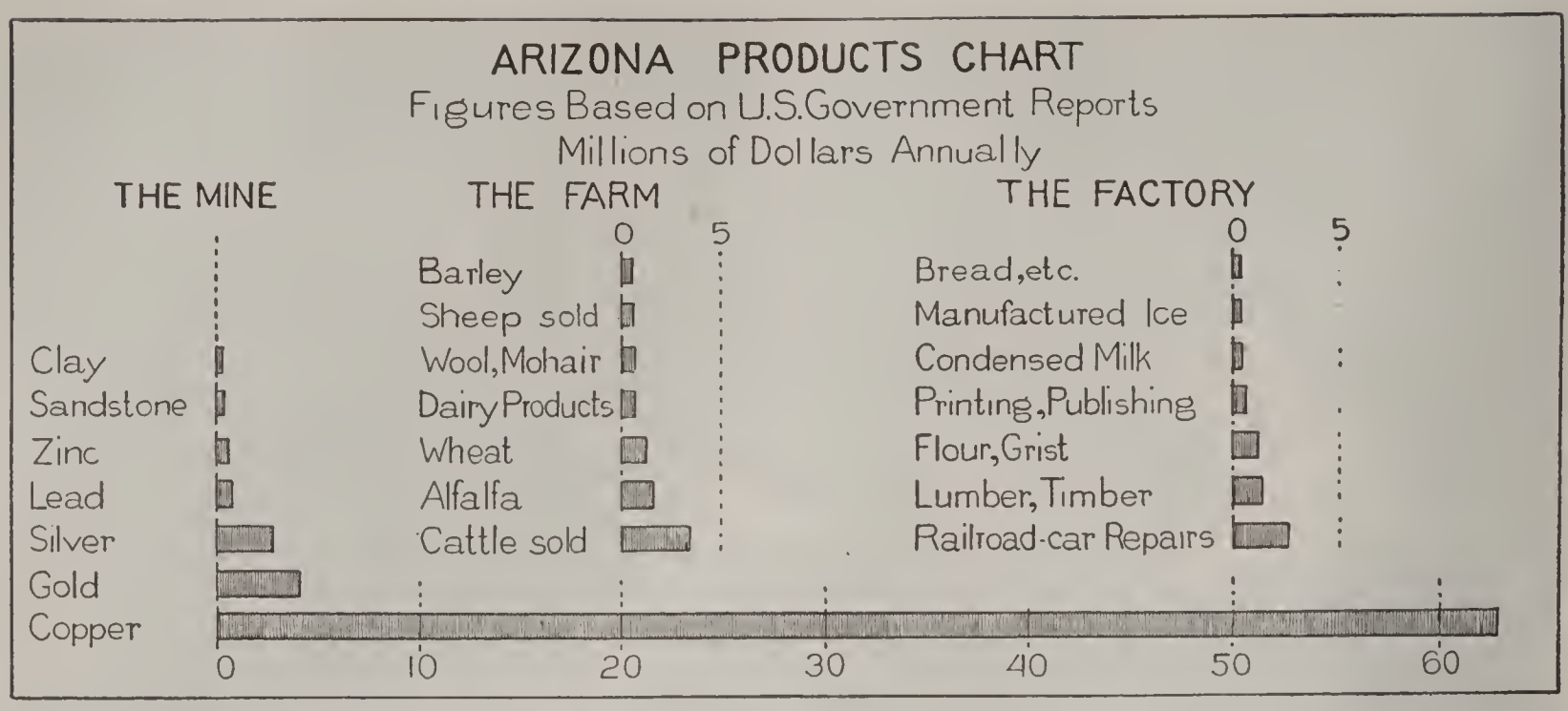
Minerals. The great wealth of Arizona lies in its minerals, few if any of the states surpassing it in the richness of its deposits. Some of the mines have been worked since the early Spanish occupation of Mexico, or over 300 years, but until the last few years mining has not been highly developed, owing largely to the lack of transportation facilities. To-day Arizona stands first in the production of copper, Montana being its only close competitor.



IRRIGATION PROJECTS

The black portions mark areas under irrigation in 1917.

About 400 million pounds of copper are taken from the mines each year, and over 11,000 men



are employed in the copper-mining industry. See COPPER.

Next in importance is gold, but this is by no means a close second, the annual output being valued at slightly more than $4,000,000. Silver, largely obtained as a by-product in the smelting of copper, attains a value between two and three million dollars; lead and zinc are also produced.

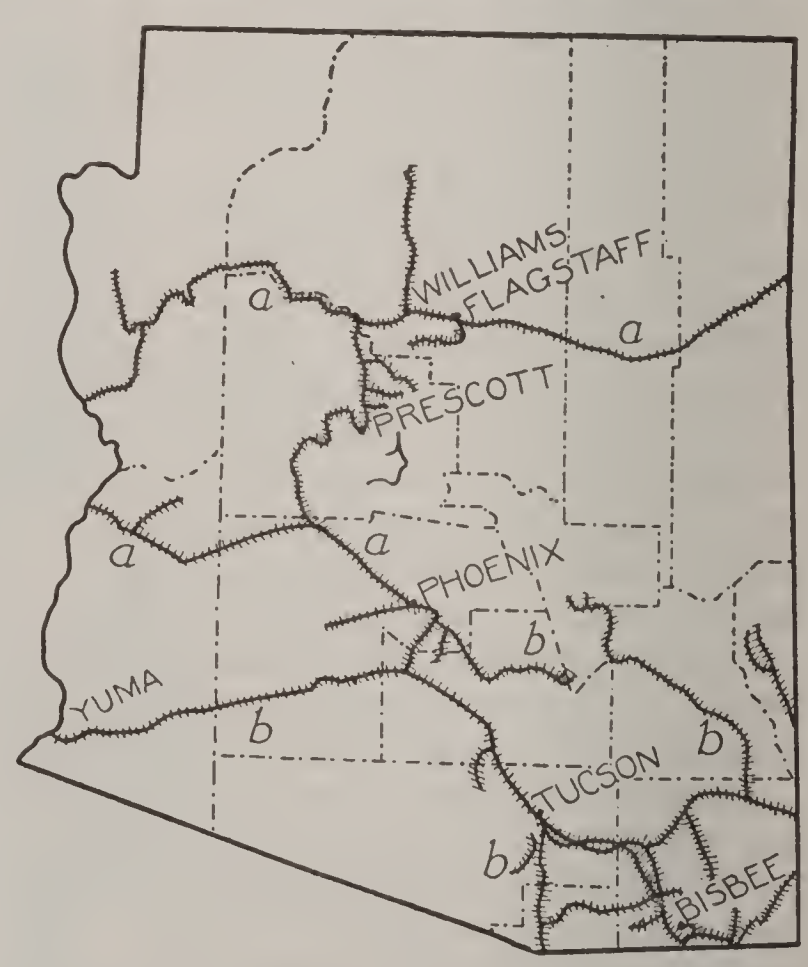
Manufactures. For the most part the manufacturing operations are connected very closely with the mining, copper-smelting and refining being the most important. The products of this industry are worth about twice those of all the other industries combined. The state has flour and grist mills, lumber mills and car shops, and while these are of no great importance now, nearly all of them are growing.

Arizona has certain manufactures which are characteristic and of great interest to visitors. These are the baskets, pottery, rugs and blankets made by the various Indian tribes. When a train on one of the great trans-continental railroads arrives at a station, there is to be seen squatted on the ground a row of stolid squaws, each with her heap of handiwork. The number of manufacturing establishments in 1920 was nearly 500; the capital employed, $171,000,000; value of products, $115,000,000.

Transportation. Two transcontinental lines of railway, the Atchison, Topeka & Santa Fe and the Southern Pacific, cross the state, the former in the northern part, the latter in the southern. Of the 2,345 miles of railroad in the state, the Santa Fe has 978, the Southern Pacific 537. A line known as the Santa Fe, Prescott and Phoenix connects the two main lines, passing through Phoenix and Prescott, two of the chief cities, and various branch lines lead to other important towns and to the Grand Canyon of the Colorado.

The state has little river transportation, only the Colorado River on its western border being navigable.

Educational and Other Institutions. Despite its scattered population, Arizona maintains a well-organized school system, and has compulsory education laws. Public school lands of great extent furnish a permanent fund, but

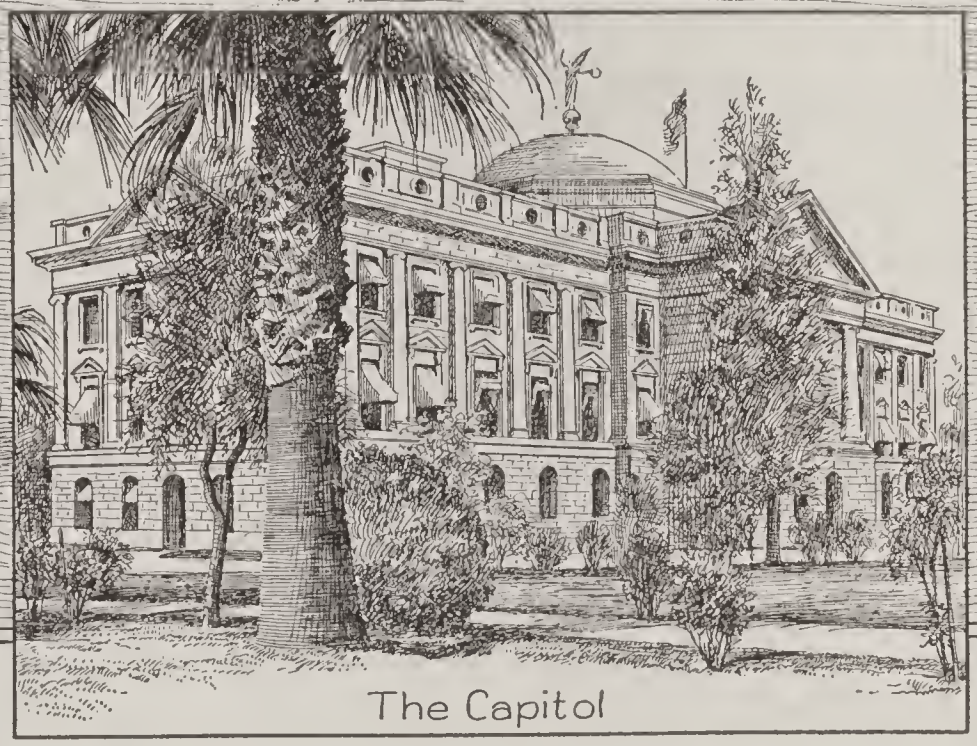


RAILROADS
(*a*) Atchison, Topeka & Santa Fe, (*b*) Southern Pacific.

local taxation is necessary also. Free textbooks are supplied, and there is a teachers' pension fund. Of nearly 60,000 persons of school age (six to twenty years) in the state in 1915, over 32,500 were actually attending

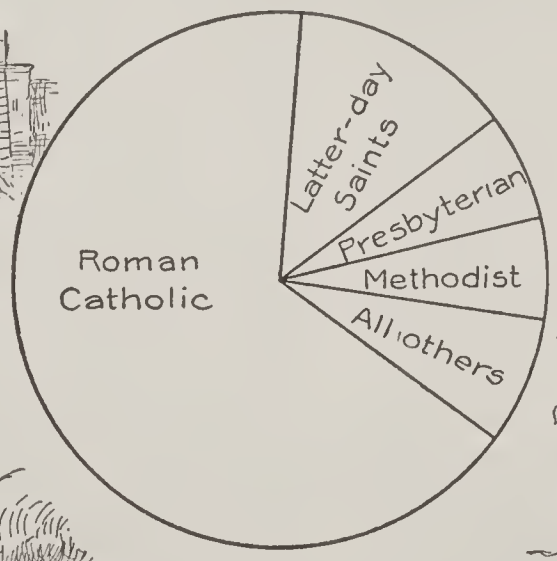
Agricultural Building, State University

ARIZONA

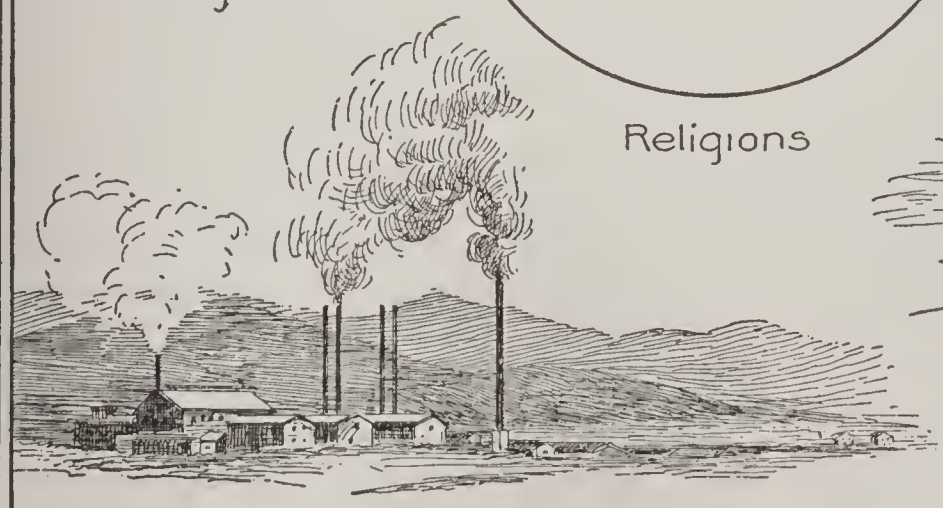


The Capitol

Indian Woman
Weaving Basket



Religions



An Arizona Smelter

Montezuma's Castle, one of
the Cliff Dwellings, near Prescott

school. There are high schools, normal schools at Tempe and Flagstaff, a state university at Tucson, and schools for the Indians at Phoenix and Tucson, in addition to those on the reservations. In 1910 the illiteracy percentage was 20.9, but it is the Indians and Mexicans who make it so high. Only 4.2 per cent of the native white population over ten years of age cannot read and write.

Other Institutions. The state maintains a prison at Florence, an industrial reform school near Willcox, and an insane asylum at Phoenix. There are, in addition, a Home for Aged and Infirm Arizona Pioneers and a Children's Home, the former at Prescott, the latter at Phoenix.

Government. Arizona is governed under the constitution of 1911, which provides for a governor, secretary of state, state auditor, state treasurer, attorney-general and superintendent of public instruction. Each of these holds office for two years, and all except the state treasurer may be reëlected. The legislative body consists of two houses, a senate of nineteen members and a house of representatives of thirty-five members. The most interesting phase of the legislative question is the existence of laws providing for initiative and referendum (which see). The initiative permits ten per cent of the electors at any time to propose a legislative measure, and fifteen per cent to propose amendments to the constitution. Under the referendum five per cent of the electors may request that any measure passed by the legislature be submitted to the people at the polls, and unless a majority of the voters approve it, it does not become a law. The governor may not veto any legislation initiated and passed upon by the people, nor any measure approved by them under the referendum laws.

The judicial power in Arizona is vested in justices of the peace, county courts and such inferior courts as the law may provide, superior courts and a supreme court. For purposes of local government the state is divided into counties, but the most important government units are the cities. Any one of these may frame a charter as soon as it has 3,500 inhabitants, but every city as well as every county is restricted by certain state laws as to franchise and indebtedness.

By the constitution any male citizen of the United States, twenty-one years of age or over, was privileged to vote, but in 1912 full suffrage was granted to women. In that same year the question of the recall of officers, much debated at the time the state entered the Union (see subhead *History,* below), was settled by the passing of a law which made every elective officer, including judges, subject to recall (see Recall). A petition against any officer may be circulated by twenty-five per cent of those who voted at the last preceding election. In 1914 an amendment to the constitution was voted which provided for state-wide prohibition of the liquor traffic.

History. That the valleys of the Gila, the Colorado, the Little Colorado and the Salt rivers were once the home of Indian races well advanced in civilization may be seen from the ruins of pueblos which still exist. The fame of these had penetrated to Mexico City, far to the south, and the Spanish conquerors there heard of the famous "Seven Cities of Cibola," and their hoards of gold (see Cibola, Seven Cities of). The first white man to enter the territory was Marcos de Niza, a Franciscan friar, who passed through the Santa Cruz valley in 1539. In the next year Coronado (which see) led by the desire for treasure, visited the Moki and Zuni villages of Arizona and New Mexico. Other journeys of exploration followed, and the Roman Catholic Church established missions among the Indians. There have grown up in later times stories of the cruelties which were practised on the Indians by the Spaniards, and of their being compelled to work in the mines, but these have been proved to be without foundation. The first settlement, at Tucson, the oldest town in the state, was made in 1776.

Formation of a Territory. Certain Indian tribes, notably the Apaches, made considerable trouble, but in the early years of the nineteenth century disturbances among them practically ceased. When Mexico began its fight for independence, and the loyal Spaniards were driven out, Arizona became involved in the unrest, and in 1827 a new rising of the Apaches practically drove out the Church. After the Mexican War the territory, with New Mexico, came into possession of the United States, except the portion south of the Gila River. This was acquired in 1854, and was known as the Gadsden Purchase (which see). In 1856 petitions for territorial organizations were sent to Congress, but were ignored because each side in the slavery contest feared that the other might thus acquire new territory. Arizona as it exists to-day was finally separated from New Mexico in 1863 and made a territory. Since 1889 the capital has been at Phoenix.

RESEARCH QUESTIONS ON ARIZONA

(An Outline suitable for Arizona will be found with the article "State.")

What is Arizona's great natural wonder?

What is the state's chief source of income?

Why was it so long in obtaining statehood?

In what strange kind of dwellings did some of the ancestors of Arizona Indians live?

How does the population compare with that of New England?

What is the hottest city in the United States, and where is it?

What is the condition of education in Arizona?

What two benefits are derived from the Roosevelt Dam?

How does the Painted Desert get its name?

Are there many people in the state who cannot read and write?

How do the names of the counties tell something of the history of this region?

Is there much cloudy weather?

Why did the Spaniards come to Arizona?

Compare the date of their arrival with that of the settlement of Virginia by the English.

Make a comparison which indicates Arizona's importance as a copper state.

Under what conditions do its Indians live to-day? What well-known articles do they make?

When did Arizona become a state?

Which state has grown the most rapidly in the last half-century, Arizona, Nevada or New Mexico?

What are the principal cities? In which one are the laws made?

In what three respects has the state shown itself a progressive law-maker?

What well-known dance takes place in Arizona?

Has the state any forests?

What famous astronomical observatory is located in Arizona?

Is the state all near sea level? Were there ever any volcanoes in this region?

After the Mexican War, why was Congress slow in organizing this territory?

Are there many Indians in Arizona?

What is the story of the state's law providing for the recall of judges?

What is the petrified forest?

Is there any coal in the state?

Besides copper, what are the chief metals?

What sort of vegetation grows in the desert?

What political party is prominent in Arizona that is of minor importance in most of the states?

Has the United States government any land here which it can give away?

Is there much manufacturing in Arizona?

Can fruits be raised successfully?

How long has Arizona belonged to the United States? Was it all acquired at the same time?

How did the state get its name?

What has irrigation done for it?

Is there anything unusual about the number of Arizona's Representatives in Congress?

Boundary disputes with every neighboring state, Indian risings and the extreme dryness of the soil made development slow for a time, but after 1896 the Indians were quiet, while irrigation schemes made possible the cultivation of more and more land.

Admission as a State. As early as 1891 the territory, sparsely settled as it was, began to agitate for admission to the Union as a state, but its petitions were denied. In 1905 and 1906, Congress passed bills favoring the admission of Arizona and New Mexico as one state, but the vote of the former defeated the plan. Finally, in 1910 an enabling act for the admission of the two separate territories was passed, and an Arizona convention prepared a constitution. This radical document included provision for the recall of judges, and because of this clause President Taft refused to assent to the admission of the state. Congress, which had passed its resolution authorizing the admission, then passed a new one, making admission constitutional on the elimination of the recall clause. Later in 1911 the people voted to make the change, and the proclamation of Arizona's statehood was signed in 1912. In that same year an amendment to the constitution legalized the recall of all elective officers, and provided for woman's suffrage. Thus, although the newest of American states, in its provisions for the recall and by adopting full suffrage for women and abolishing the liquor traffic Arizona stands in the front rank of progressive commonwealths.

Other Items of Interest. Arizona shares with New Mexico the distinction of being the youngest state, but was a territory before either Oklahoma, Wyoming, Idaho, or Montana.

Though the great Roosevelt Dam is primarily for irrigation, it supplies the power which generates electric light for the city of Phoenix.

Several of the counties of Arizona have well-known Indian names: Apache, Gila, Maricopa, Mohave, Navajo, Pima, Yavapai and Yuma are names of tribes and Cochise was a famous Apache chief. Of the other five counties three have Spanish names, Coconino, Pinal and Santa Cruz, and only two, Graham and Greenlee, have English names.

Near Flagstaff is the observatory of the astronomer Percival Lowell, known for his discoveries relating to the planet Mars.

The United States government still owns 36,000,000 acres of land in Arizona, more than half of which is as yet unsurveyed. Only in Nevada is there more land not reserved for a special purpose.

The Geological Survey estimates that there are fourteen billions of tons of bituminous coal in Arizona, none of which has been mined.

In the Canyon de Chelly, in the northeastern part of the state, are ruins of a rock fortress of the cliff-dwelling ancestors of the modern Indians. In the Rio Verde Valley, and in a canyon near Flagstaff, are caves excavated in the cliffs by an even more primitive race.

When Arizona had 9,658 people in 1870, New Mexico contained 91,874, and Nevada 42,491. Now Arizona has about five inhabitants for every eight in New Mexico and every two in Nevada.

The total copper output of Europe and Africa combined, or of Asia and Australia, or of Mexico and Central and South America does not equal that of Arizona.

East of the Painted Desert is the land of the Moki, or Hopi, Indians, whose snake dance is celebrated.

Nevada and California are the only states which spend more money than Arizona for the education of each child attending the public schools.

There are five states which have the usual two Senators, but only one Representative. Arizona is one of them.

In their first vote for President, in 1912, the people of Arizona cast more ballots for the Socialist party than for the Republicans, the next party in numerical strength. O.B.

Related Subjects. The following articles will help the reader to gain a more detailed knowledge of the state of Arizona:

CITIES AND TOWNS

Phoenix — Tucson
Prescott

INDIAN TRIBES

Apache — Moki
Mohave — Navajo

MOUNTAINS

Rocky

RIVERS

Colorado — Gila

LEADING PRODUCTS

Alfalfa — Copper
Cattle — Wool

UNCLASSIFIED

Arizona, University of — Irrigation
Grand Canyon

Consult Hamilton's *Resources of Arizona;* De Long's *History of Arizona.*

ARIZONA, University of, the only institution of college rank in Arizona, a coeducational university at Tucson under the control of a board of regents, which includes the governor, the superintendent of public instruction and eight members appointed by the governor. It was founded by act of the territorial legislature of 1885 and was opened in 1891. The school of mines is one of the university's strongest departments, Arizona being one of the great mining states; but considerable attention is given to agriculture, particularly irrigation and cattle-raising. The agricultural experiment station carries on its work not only at Tucson, but at Yuma, Phoenix and other points. The students number over 1,600, the instructors, about 80; the library contains about 25,000 volumes. The income of the university amounts to about $450,000 annually, derived chiefly from Federal and state appropriations. The university has also received several large private bequests and fifty-seven sections of rich timber land from the United States government.

ARK. In the Bible, three objects are referred to by this term, all of which are vessels for the safe-keeping of some precious object. (1) The floating vessel built by Noah in which he and his family and various animals were preserved during the Deluge (*Gen.* VI). Measured by the common standards of to-day, the ark was 450 feet long, seventy-five feet wide and forty-five feet high. (2) The cradle of bulrushes in which Moses was placed by his mother (*Exod.* II). (3) Ark of the Covenant. This was the sacred chest which the Lord directed Moses to make to contain the tables of the law which he had received on Mount Sinai. It was four and one-half feet long, two and one-fourth feet wide and two and one-fourth feet high. It was covered within and without with gold and was carried by staves inserted in rings on the corners. This Ark of the Covenant was the most sacred possession of the Israelites. It was placed in the Holy of Holies in the Tabernacle and later in a similar position in Solomon's Temple (see *Exodus* XXV, 10-22; XXVII, 1-9).

ARKANSAS, *ahr' kan saw,* one of the south-central states of the American Union, popularly known as The Bear State. It lies wholly to the west of the Mississippi River, which separates it on the east from Tennessee and Mississippi. On the south it is bounded by Louisiana, on the west by Texas and Oklahoma, on the north by Missouri. It is essentially a Southern state in its spirit and ideals as well as in its climate, much more so than is Texas, which extends far south of it. Its state flower is the apple blossom, a most appropriate choice considering the prominence of the apple in its agricultural development.

Size. In size Arkansas ranks twenty-sixth among the states of the Union and in population twenty-fifth. Its area of 53,335 square miles is but slightly smaller than that of Illinois, while its population of 1,574,449 is considerably less than that of Chicago. The Mississippi River cuts off one corner and makes the eastern boundary irregular, but the state is approximately a square, with north and south and east and west dimensions of about 250 miles. The water surface is 810 square miles, and this is practically all river, for Arkansas has no lakes except the little "cut-offs" or "ox-bows" in its river basins. These are formed by changes in the course of the rivers, which have a tendency to shorten and straighten their courses by cutting across a bend instead of flowing around it, thus leaving the old bend, with its ends closed by silt, as an "ox-bow."

Population. Of the population of 1,750,995 in 1920, about 472,220 are colored. The negroes are very unevenly distributed, almost all of them living in the cotton-growing section of the south. The average density of population is about thirty to the square mile, which is approximately that of the United States as a whole.

Few foreigners live within the limits of the state, over ninety-eight per cent of the population being native born. Especially noteworthy is the large percentage of the people

who live neither in cities nor in towns, but on farms. This class in 1910 totaled over seventy-six per cent of the entire population

ARKANSAS

Map shows boundaries, coal areas, principal rivers, important cities and greatest elevation in the state.

and the proportion seems to be decreasing very slowly. There are in the state twenty-eight incorporated places each with a population of 2,500 or more. Of the cities, the largest are Little Rock, the capital; Fort Smith, a commercial and industrial center; Pine Bluff, one of the chief manufacturing cities; Hot Springs, the famous health resort; and Argenta, which has had the most rapid growth of any city in the state. All of these are fully treated in their alphabetical order in these volumes.

Surface Features and Rivers. A relief map of Arkansas presents a very simple though not a monotonous appearance. A line drawn diagonally from the corner of the northeastern "jog" to that of the southwestern would divide the state into two fairly equal sections, a northwestern one of low mountains and hills and a southeastern one of lowland. The highest mountains, in the extreme northwestern corner of the state, are a part of the Ozark system, which sends its spurs southward from Missouri; Mount Magazine, the loftiest peak, has an altitude of 2,823 feet. This Ozark section has of recent years come into deserved prominence as one of the most beautiful scenic regions of the Mississippi Valley. Rounded peaks, rugged cliffs, unbroken pine forests, steep-cut river gorges and undulating stretches of farm land are features of its varied beauty. Sloping from this mountainous section is a stretch of hilly land which joins the southeastern plain. This plain is for the most part low—so low that overflow from the Mississippi is common, despite the levees built by the Federal government. Occasionally, however, the marshy shore is diversified with ridges and high bluffs.

It can be seen from the above description of the surface that the rivers must have a southerly or southeasterly trend. The Arkansas, the greatest river of the state, runs from northwest to southeast, dividing the state into two nearly equal parts. In its sluggish course, very different from its earlier, swifter phase, as it rushes through the Royal Gorge of Colorado, it carries down to the Mississippi great quantities of silt and has gradually built a huge sandbar across its mouth.

Other rivers of importance are the White, which enters the state from Missouri, receives the Black and Cache rivers, and after a very twisted course joins the Arkansas; the Red River, which crosses the southwestern corner; the Saline, a tributary of the Red; and the Ouachita, which drains the south-central portion of the state. These numerous rivers are of the utmost importance to Arkansas. Not only are most of them subject to overflow in the lower part of their courses, thus depositing a fertile alluvial soil, but they provide about 3,000 miles of navigable waterways. All in all, Arkansas has more miles of waterway in proportion to its area than any other state.

Climate. The variation in surface tends to bring about a certain variation in climate, and sections of the lowland are very hot and unhealthful, the familiar malaria of the river-bottoms prevailing. In the higher parts of the state, however, the climate is mild and pleasant, free from extreme heat and drought in the summer and cold in the winter. For these reasons the Ozark region has attained a reputation as being beneficial for people with lung diseases.

The summers are noticeably longer than in Missouri or in Kansas, for Arkansas receives the warm winds from the Gulf of Mexico. The highest temperature ever recorded within the state was 106°, the lowest 12° below zero, but

these extremes are very unusual, the average January temperature being about 40° and that for July about 80°.

Very little snow falls in Arkansas, but there is always plenty of rain. Droughts of any length are practically unknown, so the farmer need never fear the loss of his crops through lack of rain. In some sections 46.5 inches for the year is the average rainfall, but for the entire state it is but 40 inches.

Mineral Springs. It is not only by reason of its climate that Arkansas is visited by people in search of health; but in its numerous mineral springs it has a far more active health-giving agency. Geologists believe that far below the surface of the earth the rock masses are still hot, and that it is contact with these that produces the high temperature of the springs. Northern Arkansas has one famous spring region, at Eureka Springs, where gather thousands of visitors annually, but the most famous health resort of the state is Hot Springs, the "Baden-Baden of America," as it is sometimes called. The Indians knew well the value of these springs, about fifty in number, and spread abroad tales of their wonderful properties. These grew and grew until they culminated in the report of a "Fountain of Youth," which led Ponce de Leon across the world. See Hot Springs.

Agriculture. Its mild climate and excellent soil make Arkansas an agricultural state of importance. Its variations in altitude make possible the raising of practically all crops that may be grown from the Gulf of Mexico to the Great Lakes. Though a comparatively small proportion of the area is under cultivation, that part is constantly increasing and yields an excellent return.

Chief of the crops is *cotton,* of which about a million bales of nearly 500 pounds each are produced in a year, mostly in the rich, black soil of the southeastern lowlands. Some of it is of the very finest quality. Arkansas ranks sometimes sixth, sometimes seventh among the cotton-producing states.

One crop exceeds cotton in acreage, and sometimes in value, and that is *corn,* which is grown on more than one-fourth of the cultivated land. For the most part this is raised in the valleys and plateaus of the hilly section, but the alluvial region is also good corn-growing land. Oats and wheat have been rapidly increasing in importance in the last few years. In the lowest lands, part of the old flood plain of the Gulf of Mexico, are vast fields of *rice,* which produce in the neighborhood of 5,000,000 bushels each year. Statistics in regard to the rice-industry in Arkansas are difficult to give, so rapidly do they change, for the increase in rice-production has been one of the astonishing features of recent agricultural development. Even in the best-watered regions irrigation is necessary for the growth of rice, and it has been the increase in irrigating features that has made rice-culture of importance. (See Rice, for map showing center of production.)

The northwestern mountain section is locally known as the "Land of the Big Red Apple," and the excellent product of that region has become widely known. Apples are not the only fruit that thrives there, however; the peach crop is even more valuable, and in some years only California surpasses Arkansas in the production of that fruit. Strawberries, too, are extensively cultivated, the "patches" yielding over 12,000,000 quarts a year.

Stock-Raising. For a long time comparatively little attention was paid to this industry, despite the fact that the stretches of grazing lands, the large corn-supply and the everywhere-present springs and streams offered the best of opportunities. Recently, however, stock-raising has been growing in importance, and as a result forage crops of many sorts have become more and more widely spread. Now there are over a million cattle and hundreds of thousands of mules and sheep within the borders of the state. In 1913 there were more than 1,500,000 swine. The finer breeds of hogs thrive as well on the acorns with which the forest areas abound as do the "razor-backs," and hog-raising can be carried on very cheaply.

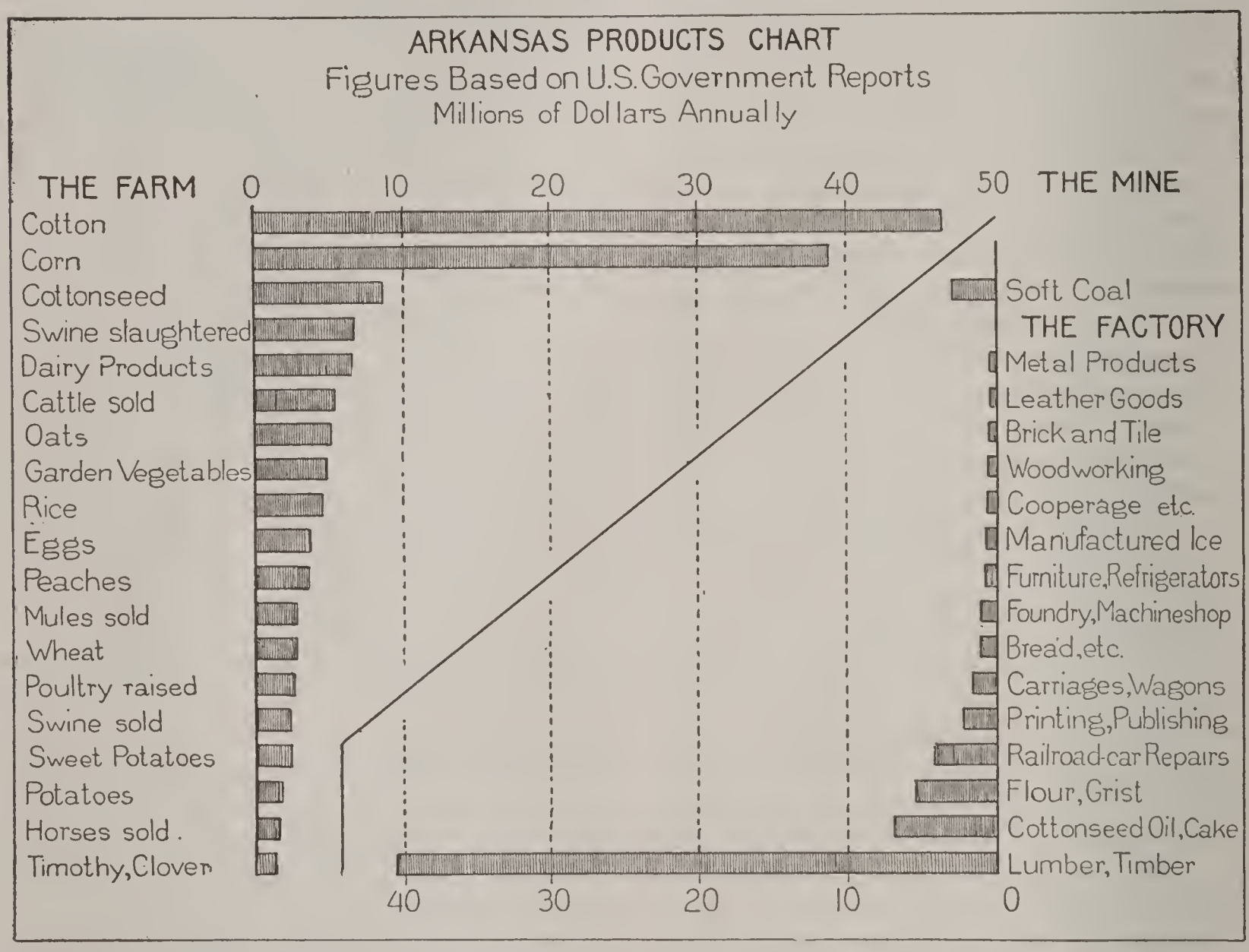
Forests and Lumbering. Arkansas is one of the most heavily wooded of all the states, about three-fourths of its area being yet in forests. Both hard and soft woods are to be found here: oak, cedar, the valuable black walnut, cypress, pine of various species, beech, red gum, maple and hickory are abundant, and the hardwoods vie with those of any other state in quality and value. Despite the great area of its forests the state has recognized the need for economy and has taken measures to prevent the deforesting of large tracts. One National Forest containing 1,073,955 acres already has been set aside in the western section, and another is to be established in the Ozark region.

Manufactures. With this vast supply of tim-

ber it is natural that industries connected with lumber should be of prime importance. Lumber to the total of over two billion feet is produced annually, and is valued at almost $32,000,000. Some of the largest sawmills in the world are to be found in the southeastern section, where grows the yellow pine. Sashes, blinds, doors and interior finishings are also manufactured and shipped in large quantities.

Next in importance are the manufacture of cottonseed oil and cake and flour and grist milling, but these fall far below the lumber states. For years the annual yield has been about 2,000,000 tons.

The most famous of the mineral products of Arkansas are the whetstones or oilstones found in the Ouachita Mountains. These are regarded as the best obtainable anywhere, and are used all over the world. Lead and zinc are mined in small quantities, and the deposits of bauxite or aluminum ore are so extensive that much of the aluminum ware manufactured in the United States is made from it. Arkansas also has the distinction of being the

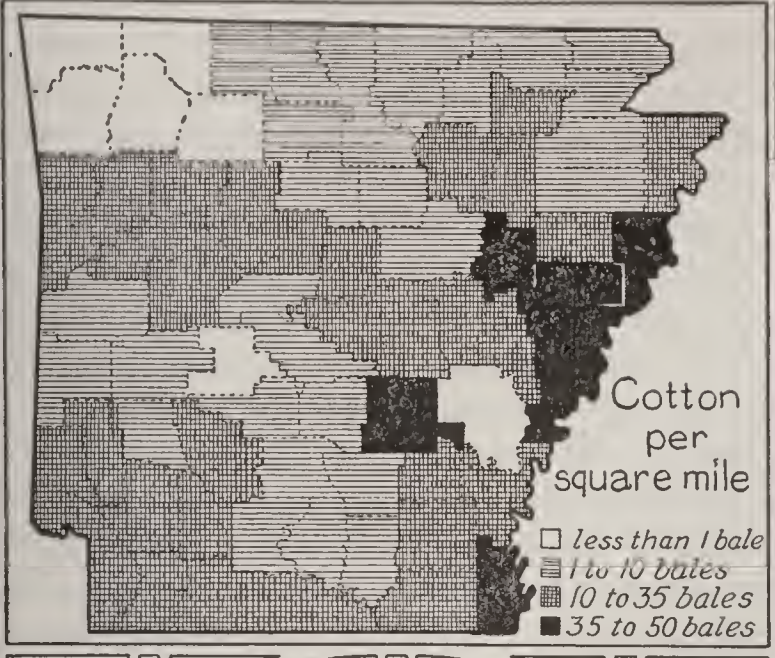


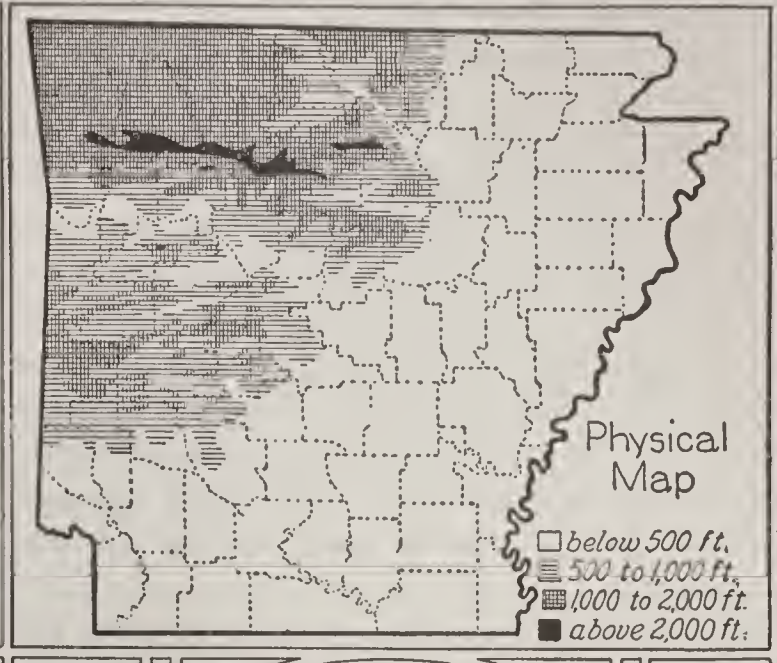
industries in the value of their products. It may thus be seen that Arkansas has had no great development as a manufacturing state, largely because of the lack of transportation facilities. In the 1920 Federal census there were 3,123 manufacturing establishments reported for the state, with nearly $140,000,000 capital.

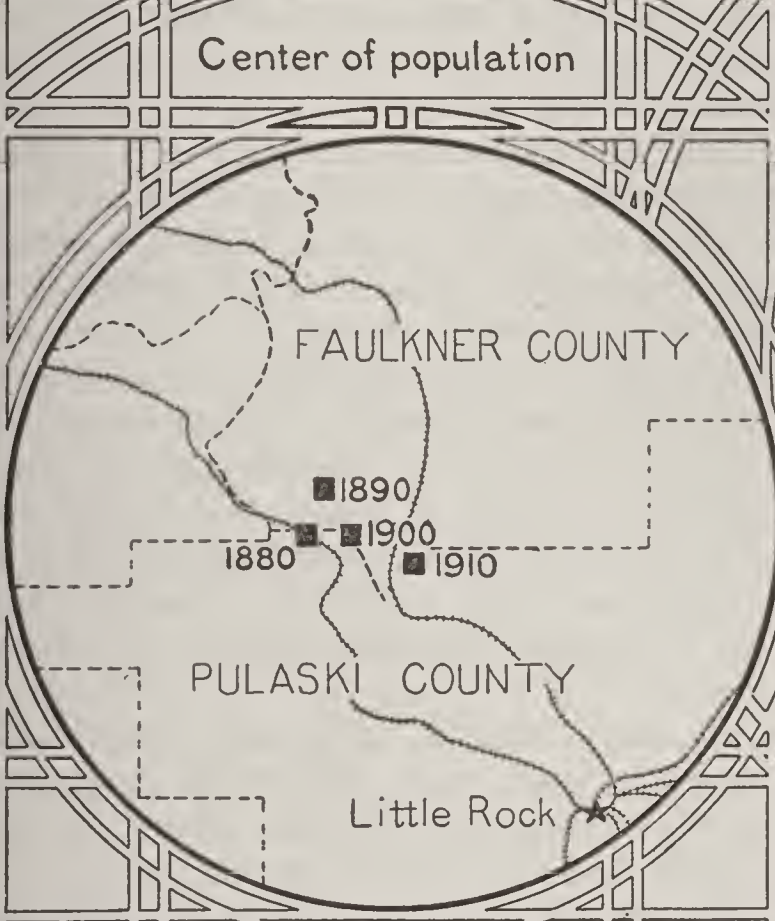
Mineral Resources. Arkansas has, chiefly in its upland section, extensive beds of coal which range in quality from lignite through bituminous to a harder variety known as semi-anthracite. Though the mining of coal is the chief mining industry, it has never been developed to any great extent, because it has been as cheap to import coal from neighboring only state in which diamonds have been discovered in any appreciable quantity. The first were found in 1906, in Pike County, and roused intense excitement, but the yield has not yet been great enough to justify any extensive mining operations. It is the belief of geologists that diamond mining may some day become important. Among the most valuable mineral resources of the state are its building stones, which include blue and gray granite in immense quantities, marble of excellent quality, limestone and slate.

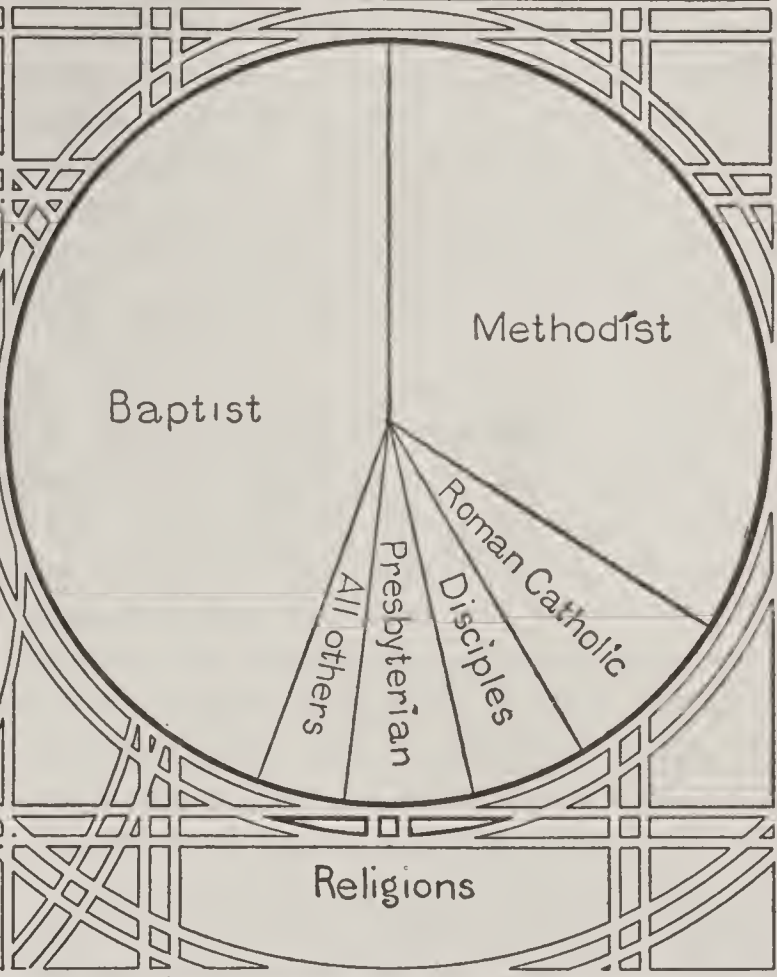
Transportation. The river systems have been particularly valuable in the development of Arkansas, and river traffic is still important, much of the commerce of the state finding

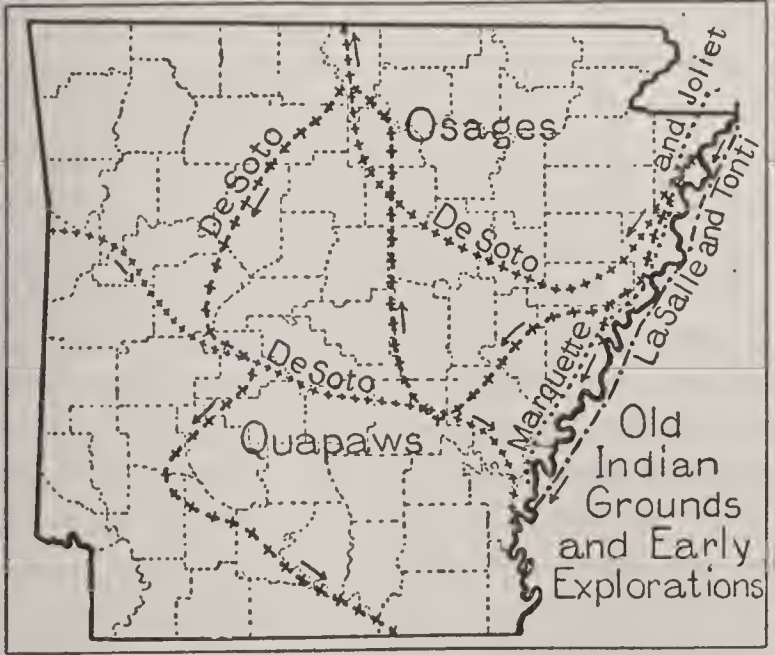
ARKANSAS

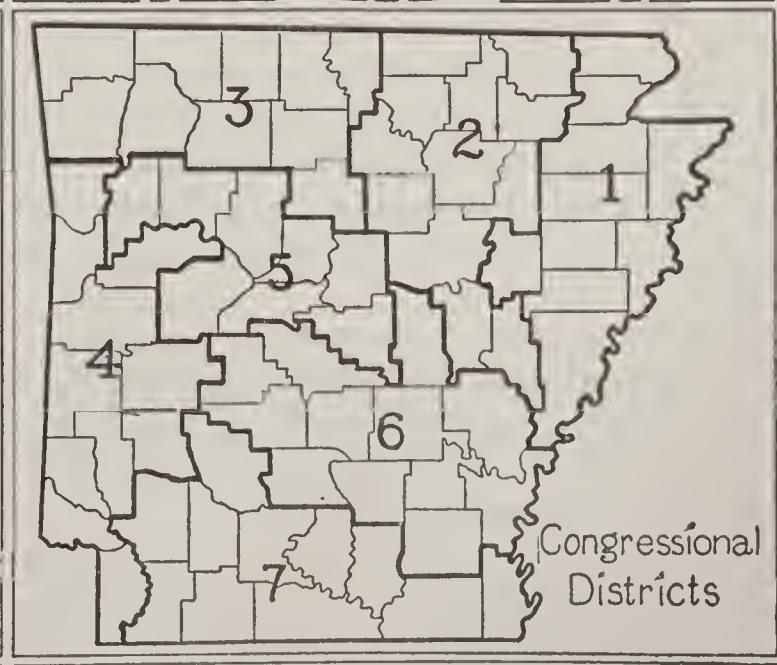

Cotton per square mile
less than 1 bale
1 to 10 bales
10 to 35 bales
35 to 50 bales


Physical Map
below 500 ft.
500 to 1,000 ft.
1,000 to 2,000 ft.
above 2,000 ft.


Center of population
FAULKNER COUNTY
1890
1900
1880
1910
PULASKI COUNTY
Little Rock


Methodist
Baptist
Roman Catholic
Disciples
Presbyterian
All others
Religions


Osages
DeSoto
DeSoto
DeSoto
Marquette and Joliet
La Salle and Tonti
Quapaws
Old Indian Grounds and Early Explorations


1
2
3
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5
6
7
Congressional Districts

an outlet through Memphis and New Orleans. But Arkansas also has an efficient railway service, though railroad-building has not been as extensive as in some of the states. Save in the mountainous northwestern section, however, there are now good facilities, and all the towns of importance are connected by railway lines. Since 1853, when the first railroad in the state was built, there has been steady though slow growth, and the state now has slightly more than 6,000 miles of line. The chief roads are the Saint Louis, Iron Mountain & Southern, the Chicago, Rock Island & Pacific and the Saint Louis Southwestern. A state railroad commission, with authority to regulate all rates, has general supervision, and the state has progressive laws as to railroad liability in case of accident.

In electric railways the state is not far advanced, there being but 113 miles in 1914.

Educational Institutions. Like all states which have a proportionately large rural population, Arkansas has found its educational problem a difficult one. At its admission to the Union in 1836 liberal provision was made for education, but no school system was organized until after the War of Secession. Recently decided advance has been made, and since 1909 a compulsory school attendance law has been in force. Local taxation is needed for the support of schools, despite the public school fund of $1,500,000, but this latter will be increased as the resources and industries of the state develop. At present the percentage in the state of those who cannot write is 12.6, but a statement of this sort is scarcely fair to the white population, as it is the illiteracy of the negroes which makes it so high.

The population of school age—six to twenty—is somewhat over 550,000, and of these about 325,000 are enrolled in the schools, negroes and white children attending separate institutions. The system includes grammar schools, over 150 high schools, normals, four agricultural schools and a state university at Fayetteville (see ARKANSAS, UNIVERSITY OF). There are also many sectarian schools and colleges, some of them of high rank.

State Institutions. Little Rock has most of the charitable and penal institutions; the Deaf Mute Institute, the School for the Blind, the Hospital for Nervous Diseases, the reform school and the state penitentiary are all in that city. Most of the convicts are not left confined in the prison, but are employed on a state farm about thirty miles from Little Rock or are leased to contractors. The system of leasing has not been successful, and repeated efforts have been made to abolish it.

Government. Arkansas has had three constitutions; the one under which it is now governed was adopted in 1874. It provides for an executive department consisting of governor, secretary of state, treasurer, auditor and attorney-general, each of whom holds office for two years. As there is no lieutenant-governor, a new election must be held if the office of governor becomes vacant, unless such vacancy occurs less than one year before the expiration of the term, in which case the president of the senate becomes acting governor.

The legislature comprises the usual two houses—a senate of thirty-five members and a house of representatives of not more than 100 members. Senators are elected for four years, representatives for two, and a session of the legislature may not last longer than sixty days unless a two-thirds vote of each house decrees otherwise.

At the head of the judiciary is a supreme court, and the lower tribunals include circuit, county and probate courts, besides justices of the peace. The units for local government are the county and the township.

Amendments and legislative acts have added certain distinctive features to the governmental system. In 1893 an amendment was passed making the right of suffrage conditional upon payment of a poll tax, in 1911 an initiative and referendum provision was made, and in 1915 a bill was passed establishing state-wide prohibition.

History. Before the coming of the white man two great tribes of Indians lived in the Arkansas region—the Osages, who lived north of the Arkansas River, and the Quapaws, or Arkansas, as they were called by the French, who lived to the south. It was from this latter tribe that the territory took its name. It was not until the early years of the nineteenth century, after the United States had gained control of the region, that these two native tribes finally left the state. The famous De Soto was the first white man to enter the territory now included in Arkansas; he spent about ten months there, journeying as far from the Mississippi as the Ozarks and the present site of Hot Springs. Indeed, it was the tales of these springs which had lured him so far from the Gulf. Some historians hold that the great explorer was buried in the Arkansas River, but most authorities believe

that it was into the Mississippi that his body was lowered. (See De Soto, Fernando.)

For over a century and a half after his death no white man visited the region, but in 1682 La Salle took possession of it in the name of France. Four years later French traders established a settlement at Arkansas Post, not far from the mouth of the Arkansas River, but no attempt was made to open up the wilderness. Ceded by France to Spain in 1763, and in 1800 back again to France, Arkansas came into the possession of the United States in 1803 as part of the Louisiana Purchase (which see). For a time it was governed as a district of Missouri, but in 1819 was organized as Arkansas Territory, the present state of Oklahoma being included with it. On June 16, 1836, it was admitted to the Union as the twenty-fifth state, and for a time its growth was rapid.

When the War of Secession broke out there was doubt as to which side the state would join, for though slavery existed within its borders its population was fairly evenly divided between northern and southern sympathizers. Secession was decided upon, however, and several battles during the war occurred within the boundary of the state. Little Rock was captured by the Union forces in September, 1863, and in the next year a constitution was adopted which prohibited slavery. This was rejected by Congress, however, the action due largely to the reconstruction quarrel in Congress, and not until 1868 was the state readmitted to the Union (see Reconstruction). Meanwhile the carpet-baggers had come, with the evils which always attended them, and strife ran high between the carpet-bag faction and the "reformers" (see Carpet-Baggers). In 1874, during the election of a governor, civil war was averted only by Federal aid. With the adoption in that year of the present constitution an era of renewed peace and progress began for the state which had for more than a decade been harassed and retarded in its development. The Democrats have been uniformly victorious in elections.

During recent years the history of the state shows steady progress in the development of resources and industries The outstanding events have been the legislative enactments mentioned above—the initiative and referendum and anti-saloon bills.

Other Items of Interest. The bowie knife, first made in Arkansas for a brother of James Bowie of Alamo fame, is frequently known as the "Arkansas toothpick," and the state is sometimes nicknamed the *Toothpick State*.

The Black River and the White River abound in mussels, which are sought not only for the pearls which they contain, but because the shells form the basis of the pearl-button industry.

It is estimated that the state has no fewer than 130 different kinds of trees.

Some of the springs have a flow so strong that they furnish abundant water power. In Fulton County, for instance, there is one appropriately called Mammoth Spring which discharges about 9,000 barrels every minute.

No other state has so small a per capita public debt.

The state furnished 55,000 men to the Confederate armies in the War of Secession.

Seventy years ago, or thereabouts, the Arkansas cut a new channel across to the White River, about sixty miles above the mouth of the latter. The island formed by this cut-off is a heavily forested region abounding in game—a veritable sportsman's paradise.

In some parts of the state the summers are so long that two vegetable crops may be grown.

"Lost hills" is the picturesque name given to those heights of land which in the rainy season are surrounded by impassable swamps.

Scarcely a farm or garden is to be found in the state which does not have its sweet potato patch.

When the rivers of Arkansas overflow it does not indicate that there has been a heavy rainfall within the state, but that in Texas much rain has fallen or far off in the Rockies in Colorado the snow is melting rapidly.

Alligators are found in the Mississippi as far north as the mouth of the Arkansas.

Arkansas watermelons are especially fine, and are shipped all over the country.

In early days bears were numerous, as the popular name of the state would indicate.

The Arkansas Traveler is the name of a humorous dialogue which is given with violin accompaniment, the music being of a peculiarly lively nature. O.B.

Related Subjects. The reader who desires a more detailed knowledge of Arkansas will find the following articles helpful:

CITIES AND TOWNS

Argenta	Jonesboro
Fort Smith	Little Rock
Helena	Pine Bluff
Hot Springs	Texarkana

RESEARCH QUESTIONS ON ARKANSAS

(An Outline suitable for Arkansas will be found with the article "State.")

Where does Arkansas rank among the states with reference to mileage of navigable rivers?

What are "ox-bows," and where are they to be found?

What was the origin of the wondrous tales which brought Ponce de Leon to America?

Who was the first white man to set foot on the soil of Arkansas?

To how many countries has the territory comprised in this state belonged?

Give two nicknames of the state and tell the origin of each.

What is the state flower? Is it especially appropriate?

What advanced legislative enactments have been passed within recent years?

Has the state more or fewer people to the square mile than the United States as a whole?

What river of Arkansas, in its earlier stages, before it enters the state, flows through one of the most famous canyons in the country?

Which could Arkansas better afford to lose, its lumber or its cotton? Its lumber or its corn?

Do the large proportion of the people live in towns or in the country?

What specially beautiful scenic region has Arkansas?

How can melting snows in the Colorado mountains affect the Arkansas farmer?

Are the farming and manufacturing industries fairly well balanced, or does one greatly outweigh the other?

What is the *Arkansas Traveler?*

How many times would the greatest altitude of Arkansas have to be multiplied to equal the greatest in Colorado?

What state, considerably larger than Arkansas, was part of the latter when it was first organized?

What city has had a particularly rapid growth in recent years?

Do the rivers furnish anything of value except transportation and water power?

Why are the summers longer than in Missouri or in Kansas?

What do these long summers make possible?

Why has rice-culture increased so noticeably in recent years?

What is the "Baden-Baden of America"?

What pleasant name is given to the northwestern region to indicate one of its chief resources?

What special facilities has the state for stock-raising, and what advantage is being taken of them?

Has the penal system of the state any unusual features?

What mineral product of Arkansas is unsurpassed elsewhere in the world?

If a botanist were confined in his labors to this one state, could he learn about many trees?

What are "lost hills"?

Has the state made any provision for conserving its forests?

What three things are needed to make possible extensive manufactures? Which of them, if any, does Arkansas lack?

How far north are alligators found?

How does Arkansas rank among the states as regards its per capita debt?

Is the most valuable crop always the one to which the largest acreage is devoted?

EDUCATION

Arkansas, University of

HISTORY

Carpet-baggers
Louisiana Purchase
Quapaw
Reconstruction

MOUNTAINS

Ozark

LEADING PRODUCTS

Apple
Corn
Cotton
Hone
Lumber
Rice

RIVERS

Arkansas
Mississippi
Red
Washita
White

Consult Monette's *Discovery and Settlement of the Valley of the Mississippi;* Reynold's *Makers of Arkansas History.*

ARKANSAS, a river of the United States, which is, excepting the Missouri, the largest tributary of the Mississippi. Its drainage basin, which has an area of 188,000 square miles, includes parts of Arkansas, Texas, Oklahoma, Missouri, Kansas, Colorado and New Mexico. Rising on the east slope of the Rocky Mountains in the central part of Colorado, it first flows with rapid current through rocky canyons, one of which, the Royal Gorge, is nine miles long and one of the deepest and most beautiful canyons in North America. In its upper course much of its water is used for irrigation, and in its lower course, below Fort Smith, Ark., at high water it is navigable for small steam vessels. The total length of the river is about 2,100 miles; its general direction is to the southeast, though it makes one pronounced northward bend in Central Kansas. See ROYAL GORGE.

ARKANSAS, a tribe of Indians of the Sioux family. They are generally known as Quapaws, under which name they are described in these volumes.

ARKANSAS, UNIVERSITY OF, a state institution established in 1871. Colleges of liberal arts and sciences, engineering, agriculture, a school of education and an agricultural experiment station are all located at Fayetteville, in the heart of the Ozark Mountains. The medical college is at Little Rock, and the branch normal college for negro students is at Pine Bluff. All the divisions of the university located at Fayetteville require a four-year high school course for entrance. The annual enrollment is over 3,600, and the number of professors and instructors about 150. The annual income is approximately $750,000, derived chiefly from appropriations by the legislature and from funds received from the United States government under the Morrill Act of 1862 and later acts of similar purpose.

The university has also an extension division for extension work in agriculture and home economics. The extension work is done under a coöperative agreement with the United States Department of Agriculture at Washington, and it is the pride of the university that the work which it does effectively covers the entire state.

The University of Arkansas attempts to impress upon its students the importance of thoroughness in scholarship. It also emphasizes the fact that graduates of the university should attempt to make some return to the people of the state for the educational facilities furnished them, by taking part in some form of public or community service. J.C.F.

ARKWRIGHT, *ark′ rite,* SIR RICHARD (1732-1792), an English inventor of cotton-spinning machinery, who is rightly regarded as the founder of the modern factory system. As he was one of thirteen children of poor parents, he received little education, and at the age of thirteen was apprenticed to a barber. Having lived in a place where cotton-spinning was the chief industry, he early became interested in the processes used in cotton manufacture, and determined to better them. At that time cloth was made with a linen warp, as no way had been found to spin cotton fit for a warp, but Arkwright invented a spinning-frame that drew out the cotton from the carding machine into fine, hard-twisted thread, suitable for warp.

His first machine was set up at Preston, but he was forced to leave because of the rage of the workmen against a machine which they thought would take their work from them, and he moved to Nottingham, where he became associated in partnership with two men who helped him to secure a patent for his invention. In 1769 he set up his first mill, and later built a larger factory. Manufacturers tried to deprive him of his patents, and angry workmen destroyed his mills, but in the end he was entirely successful. *John Halifax* gives an excellent account of the opposition which the introduction of machinery stirred up in England. See SPINNING; FACTORY AND FACTORY SYSTEM.

AR′LINGTON, MASS., an attractive residential suburb of Boston, with a population of 11,187 in 1910, which increased to 18,646 in 1920. It is situated in Middlesex County, in

the nearly eastern-central part of the state, about six miles northwest of Boston, with which it is connected by an electric line. The city is also served by the Boston & Maine Railroad. Arlington was a part of Cambridge from 1635 to 1807. In 1762 it was made a "precinct" of Cambridge under the name of Menotomy; it became a separate township under the name of West Cambridge in 1807, and its name was changed to Arlington in 1867. The area is a little more than five square miles.

The city is an important center for market gardening. The principal manufactures are piano cases, picture frames and ice-cutting tools. Its fine library was the gift of Mrs. Eli Robbins; the high school was erected in 1915 at a cost of $225,000, and the Arlington town hall, built in 1914, cost $385,000. Several sanatoriums located at Arlington Heights suggest an ideal health resort. Sky Pond is one of the most picturesque bodies of water in the vicinity of Boston. H.C.L.

AR'LINGTON NATIONAL CEMETERY, one of the most beautiful places of burial in the United States, at Arlington, Va. About 18,500 soldiers and sailors of the War of Secession and the Spanish-American War, including a number of high military rank, lie in graves surrounding the fine colonial mansion which was once Robert E. Lee's home, but which was seized by Federal troops during the War of Secession. Headstones and monuments in Arlington cemetery can be seen from the Washington Monument and other elevated spots in Washington, D. C., which lies just across the Potomac River.

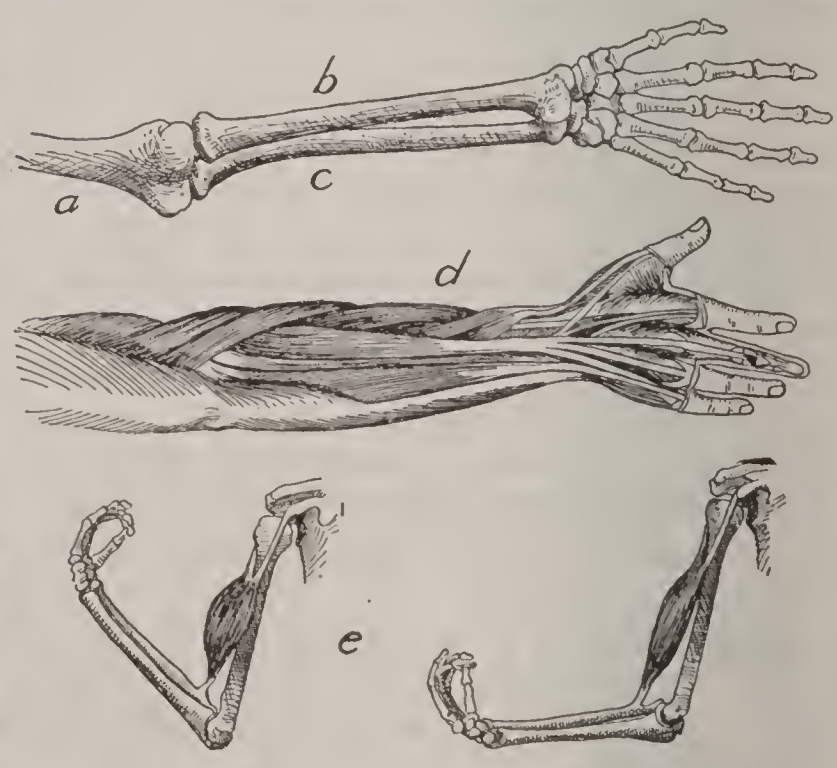
MONUMENT TO THE UNKNOWN DEAD

In Arlington National Cemetery. The inscription is as follows:

Beneath this stone
Repose the bones of two thousand one hundred
eleven unknown soldiers
Gathered after the war
from the fields of Bull Run and the route to the Rappahannock. Their remains could not be identified, but their names and deaths are recorded in the archives of their country; and its grateful citizens honor them as of their noble army of martyrs. May they rest in peace!
September, A. D., 1866.

The village of Arlington is five miles northwest of Alexandria and three miles from Washington. It can be reached from those cities by electric railway, but tourists unacquainted with this fact pay two dollars for the trip by automobile.

ARM, the term generally applied to the upper limbs of the human body. Strictly speaking, the arm is that portion of the upper part of the body which extends from shoulder to elbow, the portion from the elbow to the wrist being called the *forearm.* This distinction, however, is not usually observed, and when the arm is spoken of the entire upper limb above the hand is meant.



BONES AND MUSCLES OF THE ARM

(*a*) humerus; (*b*) radius; (*c*) ulna; (*d*) muscles of the arm; (*e*) the muscles of flexion and extension.

The arms in man, not being needed for walking as in the case of many animals, have been developed for a number of higher uses, their great freedom of motion making this possible. Though used by primitive man only for climbing, seizing food, preparing it for use and conveying it to the mouth, and for purposes of attack and defense, the steady forward march of science and invention has vastly broadened their usefulness. The arms are also

employed as a mode of expression, as seen in shrugging the shoulders, in the various movements and positions assumed in talking, and finally, in the highest development yet achieved, the art of writing.

The movements of the arm are accomplished by sets or groups of muscles, the *flexors* bending the arm, the *extensors* extending it, the *pronators* turning the forearm over (palm downward) and the *supinators* turning it back again. The flexors and extensors move and control the motions of the hand and fingers. The muscles *(biceps)* of the upper arm bend it to an angle and the triceps straighten it out again. Then, too, attached to the upper part of the upper-arm bone are great muscles *(pectoral)* which pull the arms across the chest; another great muscular mass draws the arms backwards, and there is also a muscle (the *deltoid* or shoulder muscle) which raises the arm above the head. Including the twenty-seven bones of the hand there are thirty bones in each arm. Those above the hand are the long bone of the upper arm, called the *humerus,* and the *ulna* and *radius* of the forearm. See MUSCLE; JOINTS; SKELETON; HAND.

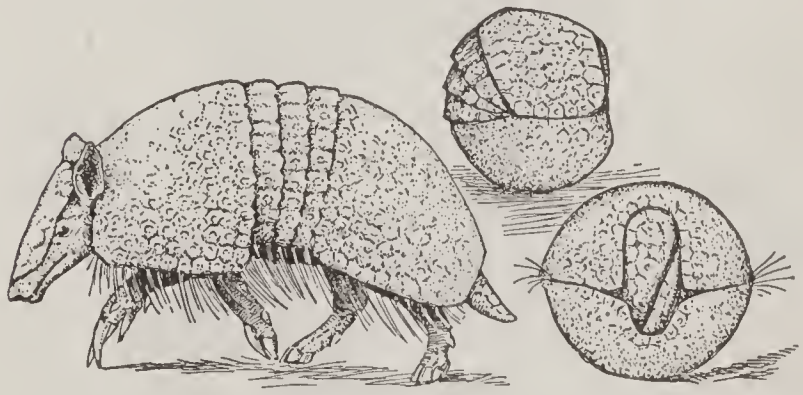
ARMADA, *ar may' da,* a name commonly used to mean the *Invincible Armada* sent out by Spain against England in 1588, though in reality it means any armed force. The great Spanish Armada was fitted out by Philip II, partially to avenge the death of Mary Queen of Scots, and consisted of 131 great war vessels, with over 19,000 soldiers and 8,000 sailors. The fleet had scarcely quitted Lisbon on May 29 when it was shattered by a storm, and had to be refitted in Coruna. It was to coöperate with a land force collected in Flanders under the Prince of Parma, and to unite with this it proceeded through the English Channel toward Calais.

As it sailed it was attacked by the English fleet under Howard, Drake, Hawkins and Frobisher, and the great lumbering Spanish vessels suffered severely from the lighter English craft, which could fire and escape before the Spaniards could train their guns upon them. Driven close to Gravelines, the armada was becalmed and thrown into confusion by fireships. The duke of Medina Sidonia, the commander, at last acknowledged his defeat and set out on his return journey round the north of Great Britain; but storm after storm assailed his ships, scattering them in all directions and sinking many. Some went down on the cliffs of Norway, others in the open sea, others on the Scottish coast. Only about fifty vessels arrived in Spain. That country's naval

ROUTE OF THE ARMADA

power, till then supreme, never recovered from this blow.

ARMADILLO, *ar ma dil' o,* an animal with an armor, which lives in South America. It is a harmless creature, and lies burrowed in the earth throughout the day, moving about only in the dark hours. When alarmed it curls



THE ARMADILLO

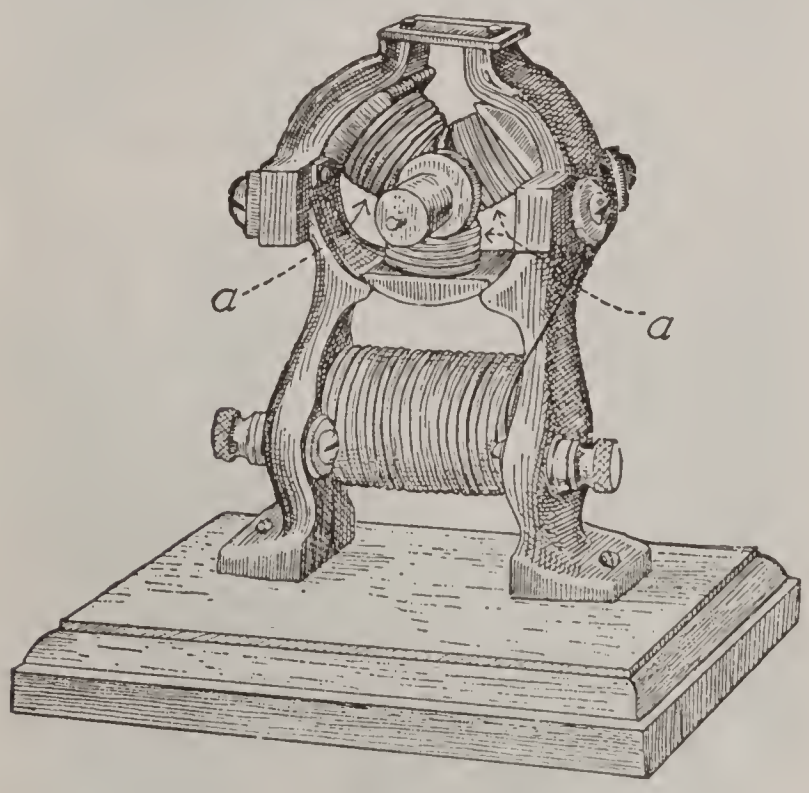
Showing, also, front and side views of the animal when curled into its shell.

itself into a ball, protected on all sides by its hard, bony shell, and rolls away from its enemy. In some varieties the armor forms two large bands about the shoulders and haunches, separated by the narrow and flexible bands; in others, it is composed of a large number of small plates.

Armadillos vary in length from three feet to only five inches. As a rule they feed on fruits and roots, but they will eat anything, and some have a liking for carrion. They frequently eat ants, and are sometimes called ant-eaters, though differing from the true animal of that name described in its proper place in this work. Their flesh is considered tasty, and they are also killed for their armor, which is made into baskets and ornaments.

ARMAGEDDON, *ar may ged' on,* a name given in the Bible to the place in which the final great battle is to be fought on the Judgment Day between the forces of good and evil. Figuratively it was applied to any spot where a decisive conflict occurred, but it had no general popular significance until used by Theodore Roosevelt during the Presidential campaign of 1912. His declaration, "We stand at Armageddon and we battle for the Lord," rescued the word from the partial oblivion into which it had fallen.

ARMATURE, *ar' ma ture,* in magnetism, the piece of soft iron or other substance which is placed across the poles of a magnet and is attracted by the magnetic force. The armature, in fact, completes the magnetic circuit.



ARMATURE

The arrows (*a, a*) indicate the drums of the armature.

The principle is the same, whether referring to electro-magnets or to permanent magnets, and is applied in the electric bell, the telegraph sounder and other instruments. See MAGNET; ELECTRO-MAGNET.

ARMENIA, *ar me' ni a,* the most persecuted country on earth, lies in the region between Asia Minor and the Caspian Sea, occupying the table-land which extends southward from the Caucasus Mountains. Once an independent kingdom, Armenia was later divided among

ARMENIA

The most unfortunate Christian community in the world. In the map the area within the small crosses marks the extent of Armenia in former days.

Russians, Turks and Persians. At the conclusion of the War of the Nations it was freed from its miseries of centuries and placed under allied protection. After the war it became a republic, and was so recognized by the allied nations. The United States took this action in April, 1920, by Presidential proclamation.

For centuries the Armenians, who are members of the oldest national Christian Church, have been mercilessly oppressed by the Mohammedan Turks and their subjects, the half-wild Kurds, and have frequently been the victims of massacres inspired by the Turkish government itself. From 1893 to 1896 at least 20,000 and perhaps 50,000 of them were slaughtered, apparently according to instructions from the Sultan, the excuse being the activities of a few hundred revolutionists. At this time the threats and protests of outside nations, especially Britain, France and Russia, induced the government at Constantinople to put an end to the massacres, but during the next two decades there were many repetitions of them on a smaller scale. In 1915 came the crowning inhumanity of all which Ottoman rulers have conceived. Claiming that the Armenians were giving help to the Russian army which rendered it necessary to remove them from the scene of war, the Turks gathered all of the population which could be found, and drove them, women, children and old men alike, into the Arabian deserts. Hundreds of thousands perished of starvation or exhaustion, just how many will never be known. Germany and Austria alone were able to bring pressure on the Turkish authorities, but the massacre in many quarters was looked upon as a necessary military measure.

History. Armenia has long figured in the world's story. The Bible gives the resting place of the ark as "the mountains of Ararat," which was the ancient name for Armenia, and tradition names Noah's great-grandson Haig as the founder of the Armenian race, whose members call themselves *Haiks*. The country was subject to the Assyrians and Medes, then freed itself but was reconquered by Alexander the Great in 325 B.C. Two satraps revolted from his successors, the Seleucid kings, about 190 B.C. and divided the land into *Armenia Major* (Greater Armenia), roughly that part east of the Euphrates, and *Armenia Minor* (Lesser Armenia), the land west of the Euphrates. Shortly afterward Armenia Major was conquered by the Parthians, and its ruler, Tigranes the Great, son-in-law of Mithridates, was forced to give tribute to Rome in 69 B.C. From then until 387 A.D., when the Persians and Byzantines divided Armenia between them, the country was sometimes under Roman, sometimes under Parthian, sometimes under Persian rule.

The religion of Zoroaster was favored in Armenia until 285, when Christianity was brought by Gregory the Illuminator. The Armenian faith is often spoken of as Gregorian Christianity.

The kingdom of Armenia arose in the eleventh century, when the Byzantine governor of Armenia Minor made himself a free ruler. At the time of the Crusades, Armenia touched the shores of the Mediterranean in the little corner between Antioch and Tarsus, and its rulers aided in the fight against the Saracens. Shortly before 1400 the kingdom was overthrown by the Egyptians and in 1541 fell to the Turks. Armenia Major, meanwhile, had been in infidel hands since 636, the Arabs first conquering it, later the Mongols under Timur, then the Turks. For a century after 885 it was a subordinate kingdom of the Caliphate of Bagdad. Russia obtained its share of Armenia in 1828, from Persia.

The People and Their Land. The Armenian race is of Aryan origin, and is thought to be very closely related to the ancient Alpine people of Europe. Before the War of the Nations the Armenians under Turkish rule numbered about 2,000,000, of whom only about one-third were in their native land. Another million were in Russia and half as many in Persia. Large numbers have emigrated to Europe and America, where they find success in many callings. Many of the bankers of Europe are Armenians. In spite of the dense ignorance of those who have remained in Asia, and the oppression to which the race has been subjected for centuries, the Armenians who reach the Western world are quick to take advantage of their opportunities for education and social betterment.

Armenia is a country which under peaceful and just rule may easily become very wealthy from the yield of its land. It has rich pastures and fertile grain lands, and valleys where cotton, rice and tobacco flourish. Olives, figs and dates grow in the south, grapes and other non-tropical fruits farther north. Both forests and mines hold wealth for the future. The highest point is Mount Ararat, 17,000 feet above the sea. The principal rivers are the Tigris and Euphrates, flowing south; the Halys, which reaches the Black Sea on the north; and the Aras or Araxes, which discharges in the Caspian. Both Lake Van and Lake Urumiah are, like the Caspian, salty. C.H.H.

Consult Gladstone's *Armenian Question;* Bryce's *Trans-Caucasia and Ararat.*

ARMOR, *ar' mer,* defensive covering to protect the wearer in battle. Such articles are of very ancient origin, though the earliest defensive armor consisted only of a shield with which to ward off blows from club, sword, arrows or spears. In time, the need for greater protection was felt, and the shield was supplemented by coverings for the most exposed parts of the body. Leather and cloth were first used, but they eventually gave place to metal. Helmets to protect the head were early adopted, then came breast plates, and later, coverings for the arms and legs. The shield and armor varied greatly, according to the fancy or requirements of the different nations adopting them. The Romans had two shields, one large and oblong, carried by the heavily armed legionaries to protect the whole body; the other, small and round, carried by mounted troops and lightly armed footmen. The Roman helmet was small, with a neck guard and two pieces fastening under the chin. The Greek helmet was large, with a lofty crest; the shield was large in the Homeric era, but considerably smaller later. Both Greeks and Romans wore greaves, jointed pieces of armor, on legs and arms, though the Romans usually wore them on the right leg only, the shield being relied on to protect the left leg.

In the days of the Crusades, knights were covered with armor from head to foot, even the hands being protected by armored gaunt-

DEVELOPMENT OF ARMOR

(*a*) The equipment of a warrior in the Stone age; (*b*) a German soldier of the third and fourth centuries; (*c*) warrior of ancient Greece; (*d*) Roman soldier; (*e*) German in full armor at time of Maximilian I; (*f*) soldier of Western Europe in early seventeenth century; (*g*) French soldier of the eighteenth and the early nineteenth centuries, the last type of armor-clad fighting men.

lets. The armor was made of plates of metal or of metal rings linked together and worn over a leather tunic. The helmet had a visor or covering for the face, and when in full armor a knight was quite unrecognizable. This led to the introduction of armorial devices and bearings worn on the shield for purposes of identification. The making of armor developed into a high art, and the metal was so well forged that the wearer was fully protected from arrows, spears and sword thrusts, except at the joints of the armor. After the introduction of gunpowder the use of armor gradually decreased, though noted armorers still provided armor which could not be penetrated by a musket ball.

Against modern rifle bullets such armor would be useless as a protection and its weight would make it impossible for the wearer to move quickly enough for the requirements of modern war. The helmet still survives in some modern armies, particularly with the Germans, and is of great value as a protection against shrapnel. Against the high-powered explosives now used by all countries, however, armor is of slight value. The only defense, entirely inadequate, is a protective coloring in uniforms which renders it difficult for the enemy to determine that a company of men is not a part of the distant landscape. See UNIFORM. F.ST.A.

ARMORY, *ar'mer i,* a building in which arms and other instruments of war are stored, and which very frequently contains rooms for the use of troops. These rooms may be merely drill rooms, but in the United States the armories devoted to the use of state militia often have all the fittings and luxuries of a gymnasium and club house combined. The state or national government pays for the buildings and for their upkeep, but the officers and soldiers provide the club house features at their own expense. An attempt is always made to have the buildings present a military appearance, and most of them are well adapted to serve as places of defense in case of trouble.

ARMOUR, *ar'mer,* PHILIP DANFORTH (1832-1901), an American merchant and philanthropist, one of the founders and for forty-one years the head of Armour & Co., the largest

pork-packing and dressed-meat establishment in the world. He was born at Stockbridge, N. Y., and in 1852 went to California, where he spent the next four years without marked success. In 1856 he engaged in the wholesale grocery and grain commission business in Milwaukee, Wis., and a few years later joined his brother, Herman O. Armour (1837-1901), and others in the pork-packing business under the name Armour, Plankinton & Co. After 1870 this firm was known as Armour & Co., and rapidly became the greatest of its kind, with branches in all parts of the world. Armour had many interests outside his business, and donated large sums to philanthropic projects. He founded Armour Institute of Technology (which see).

Jonathan Ogden Armour (1863-), his son, succeeded his father as head of Armour & Co., and he has extended the banking, railroad and other interests of the family.

ARMOUR INSTITUTE OF TECHNOLOGY, at Chicago, Ill., was founded by Philip Danforth Armour in 1892, as a school of collegiate rank to combine "broad scientific training with the elements of liberal culture." The first classes were held in 1893, and the average attendance is now about 2,200, including the number who attend the night school. Courses are offered in all branches of engineering, in architecture, and in many subjects such as political science, history, philosophy, English composition and literature, which are considered necessary to a well-rounded education. The laboratories and workshops are provided with modern equipment, and the institute has a reference library of 30,000 volumes. The productive endowment is $2,000,000, and the annual income is about $200,000. Dr. Frank W. Gunsaulus, first president, served thirty years; he died in 1922.

ARMS, a term generally applied to weapons of offense and defense carried in the hands or worn attached to supports such as belts, and wielded by hand. Weapons with which armies and navies are equipped, such as guns and cannon, not carried by one man, are classed as *artillery,* under which heading they are fully described.

Modern Arms. The soldiers of the armies engaged in the War of the Nations were armed with rifles, carbines, bayonets, lances and swords. Infantry regiments used only rifle and bayonet; cavalry men were provided with lance, sword and rifle or carbine, or only sword and carbine. Officers of all ranks carried pistols or revolvers as well as swords. The bayonet is the most modern offensive weapon not a firearm, having been invented about 1650 (see Bayonet). The weapons now used are fully described under their respective titles. See Rifle; Sword; Lance; Revolver; Spear; Bow; Machine Gun.

Historical Development. Prehistoric man probably found his first offensive and defensive weapon in a wooden club which gradually gave place to clubs and axes of stone and spears with heads of sharpened flint. Clubs were no doubt effective weapons at close quarters, but the desire to kill the enemy while at a greater distance led to the introduction of the bow and arrow and the javelin, which was hurled a short distance by hand. The crude weapons of the Stone Age were greatly improved upon when the secret of metal working was discovered. Swords, knives, axes of bronze and lances and javelins with bronze tips came into general use. These, in turn, gave place to weapons of iron, which give the name of Iron Age to the period of their use. These iron weapons were made from beaten metal, not cast in any mold, hence there was a great variety of patterns, each maker suiting his individual fancy.

Among the ancient Egyptians and Assyrians the bow was the principal weapon of offense, though short swords were worn for use at close quarters. The Greeks trusted mainly to the lance, javelin and spear, but they also carried short swords. The Roman soldier carried a sword with two edges, about twenty-four inches in length, and its use made Rome mistress of the world, none being able to withstand the attacks of the phalanxes of the Roman legions. In the Middle Ages knights were armed with lance, sword and battle axe, or mace, while foot soldiers carried bows and swords. For centuries the six-foot yew bow, discharging a "cloth yard shaft," an arrow three feet in length, was considered the most deadly of all weapons. The introduction of the crossbow was regarded as an improvement, though many of the greatest soldiers retained the older form of weapon. The longbow and the crossbow were both rendered obsolete by the invention of gunpowder, which in battle equalized the armed knight and the unprotected foot soldier. At the siege of Cambrai in 1339 cannon of unwieldy shape and size were used and hurled stones and metal balls through ranks of foot and horse. Then commenced the development of the weapons of modern warfare. F.ST.A.

ARMSTRONG, Samuel Chapman (1839-1893), the founder of Hampton Normal and Agricultural Institute (which see) and the man who fashioned the educational policy for negroes and Indians in America. He was a son of an American missionary, and was educated at Oahu College, Honolulu, and Williams College, Massachusetts. He entered the Union army, served during the War of Secession and was mustered out with the rank of brigadier-general of volunteers.

On leaving the army, he was associated with General O. O. Howard in the Freedmen's Bureau, and during the two years in which he was engaged in this work matured a careful plan for educating negroes. He then founded Hampton Normal and Agricultural Institute. To the establishment and work of this school he devoted the remainder of his life. The men and women trained at Hampton return to their native states and establish similar institutions there, or into a variety of life occupations carry Hampton enthusiasm, and in this manner General Armstrong's ideas have been extended throughout the country.

ARMSTRONG, William George, Lord (1801-1900), became famous as the inventor of the one-time remarkable Armstrong gun. He was an English mechanical engineer, whose interest in scientific work had lured him from the study of law. The hydro-electric machine and the hydraulic crane were among his earlier inventions, and in 1854 he invented the rifled gun which bears his name. On presenting his patents to the British government he was knighted by Queen Victoria and appointed engineer of rifled ordnance. The universities of Cambridge and Oxford conferred honorary degrees upon him, and in 1887 he was made a peer.

Armstrong Gun, the breech-loading rifled gun invented by William George Armstrong, first used by the British in the Chinese War in 1860. It was made of wrought iron in coils welded together and had an inner tube of steel rifled in several grooves. Although it marked a great advance when first used, it has now been superseded by more efficient weapons, which are all, however, based on the principles embodied in Armstrong's model.

ARMY

ARMY, a term applied to a body of men organized and disciplined to act together to conduct warfare on land, and placed at the disposal of a nation or person for that purpose.

Though huge hosts of fighting men were gathered in ancient times, the modern army is an outgrowth of the fourteenth-century "free companies," which were men organized under definitely-appointed leaders for the purpose of improving the art or "handicraft" of war, and of making their own services more valuable. These free companies hired themselves out to fight for those who were willing to pay for their help. Their members became the most efficient fighters and therefore were in great demand. But with them war was merely a trade. There was no patriotism in their fighting, no desire for personal distinction, no spirit of emulation. Soldiers were simply members of a well-organized labor union, fighting for pay; they lacked love of country or conviction of the justice of the cause for which they fought. Such a group were the Hessians hired by England to fight the American colonists in the Revolutionary War. It is of interest to note, however, in this connection, that some of these Hessians remained in America after the war and became citizens of the new nation, and that their descendants are to-day among the sturdiest and most loyal supporters of the government. Gradually came the end of the employment of the free companies, as soldiers fighting for hearth and home proved superior to mere war mechanics. But the methods by which the free companies had brought their fighting powers to a high state of efficiency have been retained and adapted by military authorities to meet modern requirements. This was demonstrated in the War of the Nations.

Army Organization

An army organization is the most efficient organization the world knows. When civilians proved unequal to the titanic task of building the Panama Canal, the army of the United States was called in and rapidly and successfully completed that work. In the War of the Nations, which began in 1914, the thoroughness of military methods was even more effectively demonstrated in handling foodstuffs, building railroads and organizing all the people of a nation in their agriculture and manufactures. It is, in fact, because of this very efficiency, gained at the expense of individual freedom, that militarism is opposed, for it is assumed to threaten the independence of the people.

The principle of army organization is that each man is responsible to a superior in everything, and that he must obey absolutely, no matter what the command. Tennyson gave this truth striking emphasis in *The Charge of the Light Brigade,* wherein are the lines—

"Forward, the Light Brigade!"
Was there a man dismayed?
Not though the soldier knew
Some one had blunder'd;
Theirs not to make reply,
Theirs not to reason why,
Theirs but to do and die;
Into the valley of Death
Rode the six hundred

Though all men are born equal, they cease to be so when they enter the army. Even officers of the same rank are graded, generally according to the length of their service.

Spirit. In war times more than in peace the effectiveness of an army depends upon *morale,* the spirit of its men, and upon *esprit-de-corps,* which means loyalty of the men to the organization. For this reason the volunteer system is believed by English, Canadians and Americans to produce a better body of fighting men than enforced service, for volunteers fight to win a cause and not merely to obey their superior officers.

But even in volunteer armies there is a vast difference in the degree of democracy believed to be productive of the highest discipline. There are ordinarily three grades of soldiers, commonly spoken of as *Officers, N.C.O.'s* and *Men.* The officers are more correctly termed *commissioned officers* and include all between the ranks of general or field marshal and lieutenants; they are appointed, or commissioned, by the government. *N.C.O.* means *non-commissioned officer,* a sergeant or corporal, whose appointment comes only from his own regiment. *Men* refers to privates, who have no authority except, for instance, as they are temporarily made sentries. British army officers never meet N.C.O.'s as equals, even when off duty. For one to eat with the other or to join him in amusements is considered destructive of discipline. In the militia of the United States the other extreme is reached, and the officers, though receiving their commissions from the government, are often elected by those whom they are to command. Canadian troops in theory follow the English idea of the social separation of officers, but in practice are democratic. That their indifference to discipline while off duty did not adversely affect their *esprit-de-corps* in the desperate fighting of the War of the Nations is well known.

Supplies. In modern warfare the effectiveness of an army often depends more on its organization than on the bravery of its members. Troops must be quickly transported to their stations and must have a supply of arms and ammunition at all times, and in trench warfare food and sanitation win more battles than do bullets and shells. During the War of the Nations hot meals were served to the soldiers in the trenches, even during the progress of violent battles, for it was found that each man did his work with more zeal if his hardships were lessened. In the Serbian campaigns cleanliness would have been more valuable at times than reënforcements in men or munitions.

The Parts of an Army. An army is made up of units within a unit. A mob may be organized to the extent that it will follow a leader, but its effectiveness disappears when it is divided. An army, on the other hand, can be separated into any number of parts to accomplish the work in hand. Most of the military forces of the world are nearly alike in formation, the principal differences being in the names of the units and of the officers commanding them, and in the number of men within each unit. The three main *arms* of the service are the infantry, cavalry and artillery. The engineers, aviators, signal corps, ambulance corps and others are no less important but smaller in number.

A nation may have several armies, each responsible, through its commander, only to

the commander-in-chief of all the forces. An army, in this technical sense, is composed of two to five *army corps,* aggregations of from 30,000 to 35,000 men, and each *corps* is in turn made up of *divisions.* The division is the smallest body normally containing two or more arms of the service, and its make-up varies according to its description, as an *infantry division* or a *cavalry division.* In the United States and Great Britain the following plans of organization prevail, but these are always subject to needed modifications:

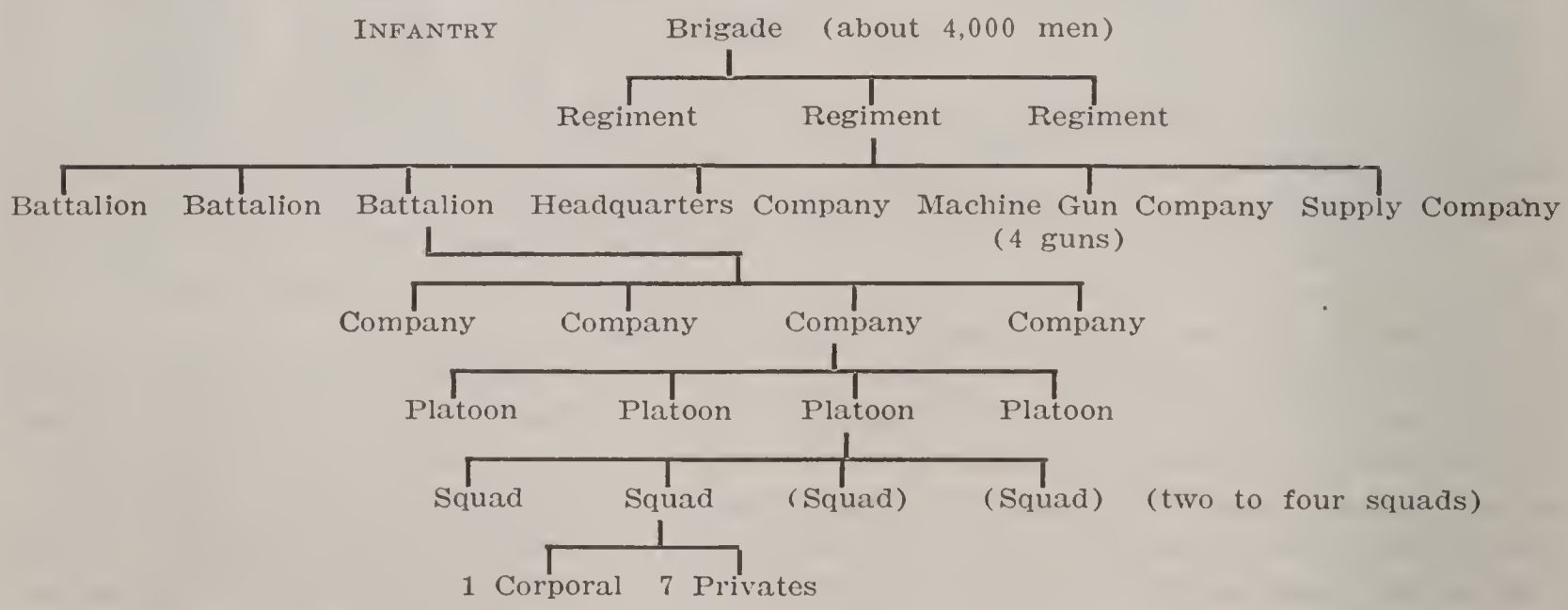
TACTICAL, OR INFANTRY, DIVISION

Great Britain		United States
3 brigades (each 4 battalions)	*Infantry*	3 brigades
1 squadron	*Cavalry*	1 regiment
4 brigades, 1 heavy battery	*Field Artillery*	1 brigade
2 companies	*Engineers*	1 regiment
1 company	*Signal*	1 field battalion
1 squadron	*Aero*	1 squadron
1 column	*Ammunition*	1 train
1 train	*Supply*	1 train
	Engineer	1 train
3 ambulances	*Sanitary*	1 train (4 ambulance companies, 3 field-hospital companies).
598 officers, 18,075 other men, 6,161 horses, 76 guns.		

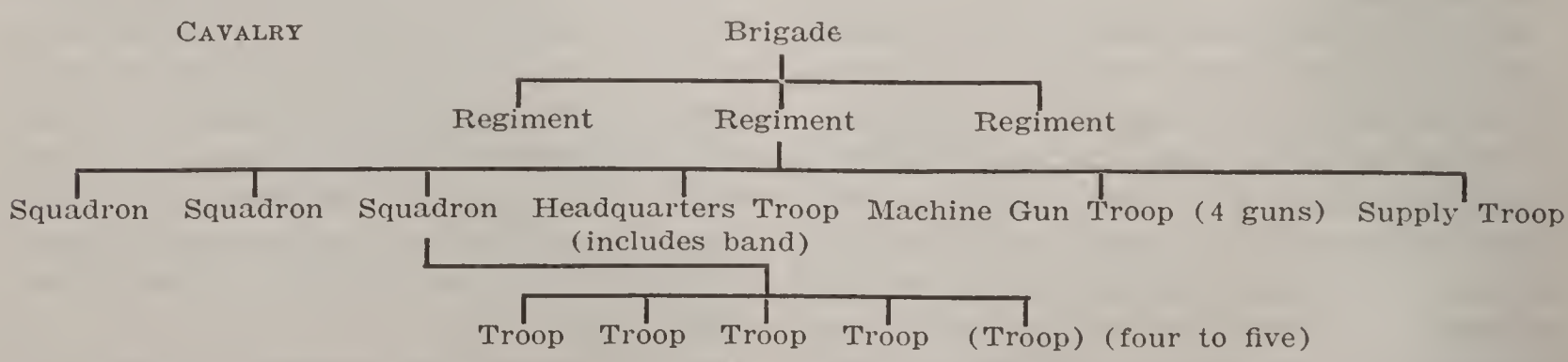
TYPICAL CAVALRY DIVISION

4 brigades	*Cavalry*	3 brigades
2 brigades	*Horse Artillery*	1 regiment
4 troops	*Engineers, mounted*	1 battalion
1 squadron	*Signal, mounted*	1 field battalion
1 squadron	*Aero*	1 squadron
	Ammunition	1 train
1 cavalry train	*Supply*	1 train
	Engineer	1 train
4 ambulances	*Sanitary*	1 train
486 officers, 9,410 other men, 10,195 horses, 24 guns.		

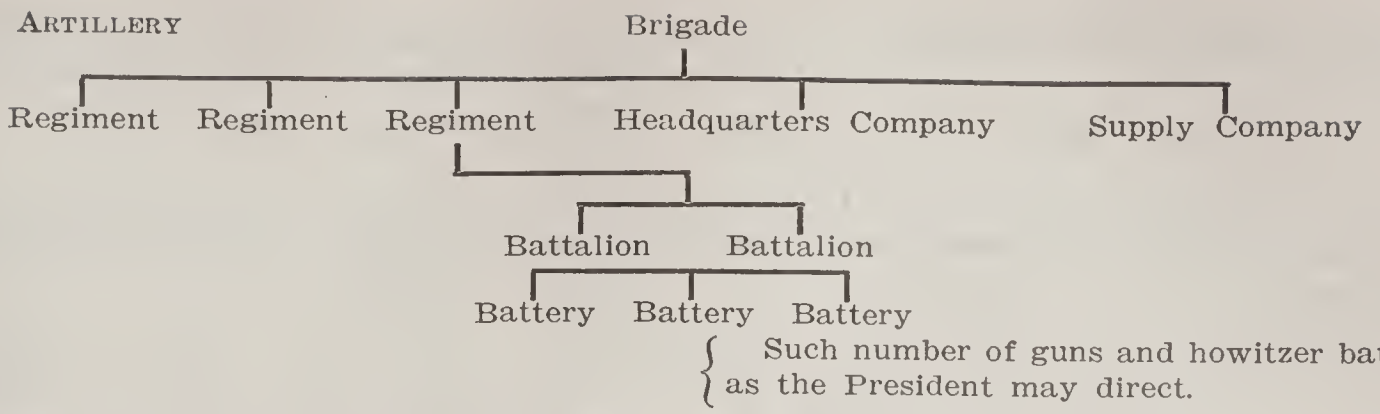
A *brigade* is the largest unit of any one arm. In the United States it is made up as follows:



A company consists of 100 men and 3 officers. (May be increased in the discretion of the President by 50 enlisted men.)



A troop consists of 70 men, 3 officers. (May be increased in the discretion of the President by 35 enlisted men.)



A battery in the field artillery contains 126 men (which may be increased in the discretion of the President by 64 men), 162 horses, 4 guns; in the horse artillery 171 men, 235 horses, 4 guns; in mountain artillery 165 men, 4 guns.

Officers. Army officers are of two types, *commanding* (line) officers and *staff* officers. The latter are the assistants to the commander of a regiment or any larger unit.

In the United States the President is commander-in-chief of the armed forces. There are several grades of *general officers,* namely, generals, lieutenant-generals, major-generals, brigadier-generals and the various members of the General Staff, such as the quartermaster-general, the adjutant-general and the paymaster-general. In times of peace the grades of general and lieutenant-general are often allowed to lapse. In war time a general would probably command an army, a lieutenant-general an army corps, a major-general a division and a brigadier-general a brigade. In Great Britain the highest officer is the field-marshal.

The commander of a regiment is a colonel. In the United States a battalion is under the charge of a major; in Great Britain, where the battalion contains twice as many companies, it is assigned to a lieutenant-colonel. A captain commands a company, assisted by two lieutenants. A squadron of cavalry is given to a major and a troop to a captain. A battery is a captain's command in the United States army, a major's in the British. The lieutenant-colonel in the United States army is merely an assistant to the colonel; in the British, he practically replaces the latter in the handling of matters of detail.

Corporals march in the ranks with the privates. Sergeants are posted as guides and in the line of file closers in rear of the company. The first-sergeant has special duties, as have also the mess-sergeant and supply-sergeant. The color-sergeants, battalion and regimental sergeants-major are members of the regimental headquarters company. A lance-corporal is a corporal whose appointment is not yet made permanent.

An adjutant (which in Latin means *one who aids*) is an assistant to the commander of a regiment, and usually holds the rank of captain or lieutenant. An *aid* or *aid-de-camp* is a general's assistant, and he may have the rank of lieutenant or colonel. L.R.G.

Armies of the World

United States. The United States army has always been small, in comparison with European armies, and military service has, except during the War of Secession, been entirely voluntary and based on the principle that "one volunteer is worth three pressed men." In 1790 the rank and file of the army consisted of 1,216 men. In 1861, at the beginning of the War of Secession, it totaled about 15,000. Between 1861 and 1865, however, nearly 4,000,000 men were enrolled in the contending armies of the North and South. These figures eclipsed those relating to any previous war and opened wide the eyes of the world to what could be accomplished by a peace-loving nation without a definite military system, if thrown into war. During that war, however, the total of the authorized regular army never exceeded 40,000 men, the remainder being special volunteers who returned to civil life as soon as their services were no longer required. The maximum war strength of the United States army in the Spanish-American War was 10,017 officers and 213,218 enlisted men, but of these only 63,000 formed the total of the authorized regular army.

Before the passage of the Chamberlain-Hay Bill, approved by the President in June, 1916, the regular army of the United States was less than 100,000 men. Of these, two-thirds were assigned to coast defenses, island possessions, recruiting points and other permanent posts, so that slightly more than 30,000 were *mobile* troops. To them could have been added in

time of war 127,000 men and officers of the militia.

The new bill increased the authorized regular army to a total enlisted force of the line of 175,000, and an aggregate of officers and men, line and staff corps, of approximately 225,000. The strength of the militia was made 425,000 and its members were required to take an oath of allegiance to the national as well as to their individual state governments. By enlistments the regular army by the beginning of 1918 possessed about 300,000 officers and men. The national guard, after the declaration of war upon Germany (see page 6171), was immediately mobilized, increasing America's potential fighting force to over 700,000 men. The conscription act of 1917 resulted in June of that year in the enrollment of nearly 10,000,000 young men between the ages of 21 and 31, from whom a great army would in time be assembled. Physical defects and exemptions disqualified over half of this number, but 4,000,000 were placed under arms and about 2,000,000 saw service overseas.

In 1922 the new army bill of 1921 was put into effect. Refusing to be impressed with the necessity of preparedness for war, the army was ordered reduced to 125,000 men. To accomplish this, the number of infantry regiments was reduced from 65 to 45, and regimental strength from 1,490 men to 1,312 men. Proportionate cuts were made in all other branches of the service at home and abroad.

Congress alone has the power to vote appropriations for the maintenance of the army, and once during the life of each Congress, which is two years, the army appropriation bill is passed. In cases of emergency a special fund is voted. The cost of the small regular army maintained before 1917 was about $95,000,000 a year, practically $1 for each citizen. With the entrance of the United States into the War of the Nations the war expenditure leaped to unprecedented figures. For the fiscal year ending June 1, 1918, the total outlay of the government for all war purposes—army, navy, aircraft, munitions, and all other war efforts—was close to $20,000,000,000. The army increased to 4,000,000 men before the fall of 1918; 2,200,000 were in France.

The pay table in times of peace of soldiers below commissioned rank in the various countries is as follows, in terms of United States and Canadian money:

Rank	*United States*	*Canada*	*England*	*France*	*Germany*	*Russia*	*Italy*
First Sergeant	$520 to $820	....	$422	$73 to $270	.....	.....	$182
Second Sergeant	360 to 576	....	198	51 to 248	$76.00	$8.72	153
Corporal	252 to 468	....	140	17 to 139	37.80	5.48	84
Private	300	$273	85	4 to 18	20.00	3.78	73

Canada. Because its only neighbor is the United States, with which it has maintained over one hundred years of peace, Canada does not need a large standing army.

The forces of the country are controlled by the Militia Council, of which the Minister of Militia is president. In peaceful times they consist of a permanent militia (including artillery) of 3,500 men, and a non-permanent militia with nearly 80,000 members. The latter drills periodically and trains in camp for a short period each year, in the same manner as the National Guard of the United States. Its members are required to serve for home defense only, and all overseas contingents are specially recruited. Over 400,000 volunteers responded during the first three years of the War of the Nations. In 1917 a conscription law was passed. The annual cost of the militia before the European war was from seven to nine million dollars, or slightly over $1 for each inhabitant of the Dominion, practically the same as for the United States.

British Army. Englishmen and Americans have never taken kindly to the idea of compulsory military service, and they object to paying for the maintenance of an army of which they do not see imperative need. The British law enacted in the Bill of Rights in 1689 expressly declares it illegal for the king to maintain an army in time of peace without the consent of Parliament. This provision has never been revoked.

The army of Great Britain is divided into two parts, one for foreign or colonial service, the other for home defense. The territorial army, organized after the Boer War, is for the latter purpose. The term of enlistment in the *regulars* is usually twelve years—seven with the colors and five with the reserve. The age for enlistment, except in cases of national emergency, is from eighteen to twenty-five. The military establishment of Great Britain before the War of the Nations in 1914 was as follows: regular army, 156,110; reserves, 209,914; territorials and militia, 258,437; colonial forces,

OUTLINE AND QUESTIONS ON THE ARMY

Outline

I. Origin of Modern Army

(1) Hired soldiers
(2) Methods of "free companies"

II. Organization

(1) Efficiency
(2) Principle of army organization
(3) Difference in rank and grade of officers and men
(4) Advantage of volunteer system
(5) *Esprit de Corps*
(6) Importance of supplies and accommodations
(7) Units of army; corps and divisions
  (a) Comparison of divisions of the armies of the United States and Great Britain
(8) Officers
  (a) Commanding
  (b) Staff

III. Armies of the World

(1) United States
  (a) Volunteer service
  (b) Militia
  (c) Cost and size of army
  (d) The Chamberlain-Hay Bill
  (e) Vocational training of soldiers
  (f) United States soldiers compared with European soldiers
(2) Canada
  (a) Small standing army
  (b) Militia for home defense
  (c) Reputation for bravery
  (d) Administration and cost
(3) Great Britain
  (a) "Territorial Army" for home defense
  (b) Division for foreign and colonial service
  (c) Enlistment and service
  (d) Administration and cost
(4) Germany
  (a) Compulsory military service
  (b) Periods of service in various divisions
  (c) Size and cost
  (d) Administration of army
(5) France
  (a) Compulsory military service
  (b) Periods of service in different divisions
  (c) Administration and cost of army
(6) Russia
  (a) Compulsory service
  (b) Terms of service in various divisions
  (c) Character of soldiers
  (d) Size and cost of army
(7) Italy
  (a) Universal service
  (b) Differences from German system
  (c) Administration and cost of army
(8) Austria-Hungary
  (a) Organization similar to German army
  (b) Size and cost
(9) Other nations
  (a) Compulsory service, general

Questions

Why is it no longer the custom to hire foreign soldiers to fight the battles of a country?

What is the difference between a commissioned and a non-commissioned officer?

What is the commander of a regiment called?

Is it correct to speak of the captain of a battalion?

What are regarded as the three main arms of the service?

How large was the regular army of the United States in January, 1916? What additions were provided for in 1916?

How many men volunteered for service in the British army in the first year and a half of the War of the Nations?

Do the majority of nations have voluntary or compulsory service?

What is a lance-corporal?

Why does Canada not need a large standing army?

What plan does Italy follow in placing its recruits, and what is the object?

87,114; total, 711,575 men. Of this number only the regular army and the reserve were available for foreign service except in cases where individuals or whole corps of the auxiliaries specially volunteered. However, before conscription was put into effect over 5,000,000 men had answered their country's call between August, 1914, and January, 1916.

The total cost of the British army (exclusive of troops for India, of which the cost is borne by the Indian government) for a year of peace is £28,000,000 (about $135,000,000), or about $3 for each person in the kingdom. A comparison with the estimated cost of the Panama Canal shows that in three years of peace the British army in England, exclusive of its oversea forces, costs more than was needed to complete the canal, which employed over 40,000 men in peaceful labors for seven years. The administration of the army is in the hands of an army council and a Secretary of State for War.

German Army. Since 1871, after the close of the Franco-German War, there was compulsory military service in the empire until its fall. Every male had to serve in the army or navy unless mentally or physically unfit. At the beginning of the European war in 1914 it was estimated that the German Empire could raise a fighting force of 7,900,000 men, all of whom had undergone military training. The total strength of the army in peace times was 770,000. Each man was expected to serve either two or three years in the standing army, and the balance of a term of seven years in the reserves, after which he was drafted into the *landwehr* (home defense force). At the age of thirty-nine he left the *landwehr* for the *landsturm,* where he remained until he reached the age of forty-five. The *landsturm* consisted of those available for service in an emergency, including both the graduates of the *landwehr* and the younger men who had escaped military training. Military service might be required from the age of seventeen, but actual training usually began at twenty. Sometimes the term with the standing army was reduced to one year in cases of men of good education and intelligence. Each army corps was recruited from a particular territory and passed its time-expired men into the *landwehr* of the same district. The peace terms of 1919 definitely limited the German army to a harmless 100,000 men.

The total cost of the army in times of peace was estimated at $210,000,000 per year, or $3.23 per unit of population. The organization and adminstration was centralized in the kaiser and a general staff.

French Army. In the year 1872, as soon as reconstruction could be effected following the disastrous Franco-German War, compulsory military service was legalized in France. The form of conscription previously in force allowed substitution; a man not desiring to serve could pay another to take his place. This led to abuses and substitution was abolished. Under the law now in force three years must be spent in the active army, eleven years in the reserve, seven in the territorial army corresponding to the German *landwehr,* and seven more in the territorial reserve corresponding to the German *landsturm.* It is estimated that at the outbreak of the War of the Nations in 1914 the troops of France totaled 703,000, of which 134,000 were in colonial service, many of them natives. Altogether there were nearly 5,000,000 trained men of military age, but it is probable that considerably more than this number were placed under arms between 1914 and 1919. The French soldiers are of rather small stature, but are wiry, active and enthusiastic. Though experts had often expressed the opinion that a French attacking force was far superior to an equal French force on the defensive, the War of the Nations proved the heroic resistance of which France is capable.

The yearly cost of the maintenance of the French army in peace times is estimated at $290,000,000, or about $7.25 per unit of population. The administration consists of a general staff and a number of departments under the Minister of War.

Russian Army. After the Russo-Japanese War the Russian army became almost an unknown quantity until the outbreak of the War of the Nations. That great changes had been made and that the efficiency of the army as a whole had been raised was proved by its rapid mobilization and stubborn work in the first three years of the war.

The military system of Russia was similar to that of Germany and France, each soldier serving in various ranks, active and inactive, from his twentieth to his forty-third year. Cossacks served for life (see COSSACKS). Active soldiers at the beginning of the European war in 1914 numbered probably about 1,300,000 and the reserves 6,000,000 or more. Estimates of the number of other men available for service range from 5,000,000 to 10,000,000.

Russian soldiers are hard fighters, though except in a few picked regiments their standard

of physique and intelligence was always low. There were severe difficulties for the nation to overcome in mobilization, because of the vast area of the country and the poor railroad communications. Although Russia supported the largest standing army in the world before the 1917 revolution the burden upon the people was never heavy. It is estimated that its total yearly cost in times of peace was about $320,000,000, or only $1.87 per unit of population. See RUSSIA.

Italian Army. The Italian army is also organized on the principle of universal liability to service. Italy claims war resources to the extent of 3,150,000 men, with a total permanent force in peace time of about 400,000.

Italian regiments are not recruited from geographical sections, but each unit receives reënforcements from all parts of the country and the troops change their stations every four years. This plan, in direct opposition to the French and German method, is adopted so that the young men from one section of the country will make friends with those from another, thus welding together the different elements of the nation. The army is directed by a Minister of War and a general staff. Its total yearly cost in peaceful times is estimated at $80,000,000, or about $2.25 per unit of population.

Austria-Hungary. The armies of the dual monarchy were modeled after those of Germany. Before the War of the Nations their strength was estimated at 820,000 regular men and about 2,000,000 trained reservists, but actually over 4,000,000 men are thought to have served in the war. By the terms of peace Austria could no longer have an army; Hungary had demobilized before 1919.

Other Nations. Most of the nations of the world follow the system of compulsory service, though in varying degrees. Japan, nearly all the European countries not named above, and some of the South American republics maintain military forces of importance. The British armies in the War of the Nations were supplemented by large contingents of volunteers from the Dominion and other colonies. L.R.G.

Related Subjects. These volumes contain a large number of articles which the reader interested in military affairs will find helpful.

GENERAL TOPICS

Adjutant
Aid-de-camp
Ammunition
Amnesty
Arsenal
Artillery
Battalion
Battering Ram
Battery
Bersaglieri
Blockade
Bombardment
Brevet
Brigade
Bugle
Cadet
Canteen
Captain
Catapult
Cavalry
Colonel
Conscription
Contraband
Corporal
Countersign
Court-martial
Crest
Draft
Ensign
Flag of Truce
Fortification
Gendarmes
Grenadier
Helmet
Hostage
Hussar
Infantry
Iron Cross
Landsturm
Landwehr
Lieutenant
Machine Gun
Magazine
Major
Marksmanship
Marshal
Military Academy, United States
Military Preparedness
Military Schools
Militia
National Guard
Neutral
Parole
Phalanx
Prisoners of War
Rank
Rebellion
Regiment
Rocket
Rough Riders
Sergeant
Shield
Siege
Signal Corps
Signaling
Spy
Squadron
Staff
Strategy
Tactics
Testudo
Uhlans
Uniform and Insignia
Victoria Cross
Volunteers
War
Zouaves

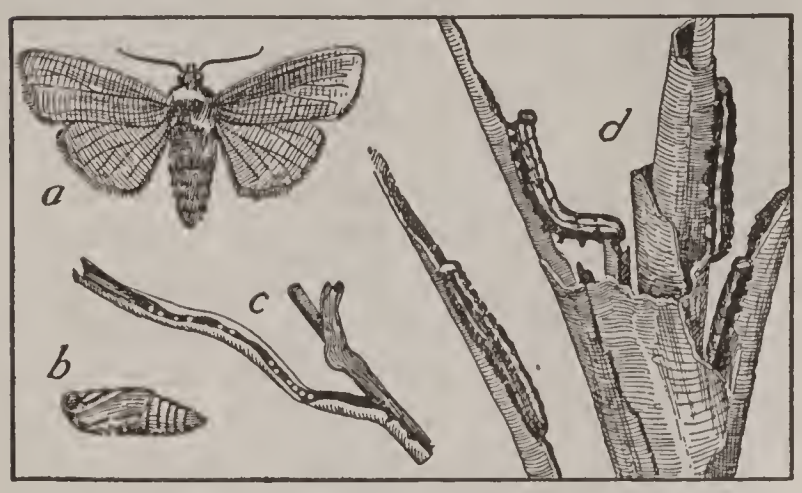
WEAPONS AND AMMUNITION

Air Bombs
Air Gun
Bayonet
Blunderbuss
Bomb
Boomerang
Bow and Arrow
Bowie Knife
Broadsword
Bullet
Cannon
Cartridge
Celts
Cordite
Fireball
Gas Bombs
Gas Clouds
Greek Fire
Grenade
Guncotton
Gunpowder
Hotchkiss Gun
Howitzer
Lance
Liquid Fire
Musket
Projectile
Revolver
Rifle
Shell
Spear
Shot
Shotgun
Shrapnel
Slings
Small Arms
Smokeless Powder
Sword
Tomahawk
Torpedo

Consult Jerram's *Armies of the World;* Ashworth's *Nations in Arms.*

ARMY WORM, a caterpillar which is so called because it sometimes appears in hordes of enormous numbers that march across the fields like great armies and devour every green thing they meet. This caterpillar is of a dark-gray color striped with yellow and is about two inches long. This insect is a native of North America, but is now found all over

the world. The perfect insect is a yellowish-brown moth, marked on each fore wing with a white spot. It flies at night and may be caught in large numbers around lights or by



ARMY WORM

(*a*) moth; (*b*) pupa; (*c*) eggs in natural position in grass leaf; (*d*) army worms on growing corn.

baiting with syrup. It lays its eggs in strings of from two to twenty, beneath the sheaths of grass stems. The caterpillar continues to grow for three or four weeks after hatching and then the insect goes into the ground for its inactive pupa stage.

The army worm is best known east of the Rocky Mountains, but it is usually so well controlled that no serious damage is done by it. When these insects appear in large numbers the field should be plowed or the crop burned. They can be destroyed by Paris green mixed with soap suds or by a kerosene emulsion, but they are most effectively destroyed by other insects which feed upon them, especially by the tachina fly.

ARN'HEM or **ARNHEIM,** *arn' hime,* a town in Holland, capital of the province of Gelderland. It is situated in one of the most beautiful districts of Holland, on the right bank of the Rhine, 35 miles southeast of Utrecht. The ramparts surrounding the older portion of the city, called *Arenacum* by the Romans, have been made into beautiful promenades. The city has many fine buildings, the most noted being the town hall, which is popularly called the Devil House, because of its weird decorations. Its principal church contains the tombs of the former Duke of Gelderland, who made the city their place of residence.

The manufactures consist of wagons, furniture, mirrors and scientific instruments, and tobacco and grain are exported. During the Middle Ages Arnhem was a member of the Hanseatic League. In 1795 the city was taken by the French, who were driven out by the Prussians in 1813. Population, 1921, 70,714.

ARNICA, *ar' ni ka,* the name of certain plants which yield a juice or a tincture known to every child because it is used on bruises to drive away the blood which collects around them. The common or mountain arnica is found in Central Europe and in the western part of the United States. It has a twisted root which lives from year to year, and a stem about two feet high which bears heads of golden-yellow flowers. Every part of the plant contains the *arnicin,* of which the valuable medicine is made.

THE ARNICA PLANT

AR'NO, a famous river in Tuscany, Italy, on whose banks stand Florence and Pisa, the former fifty miles from its mouth, the latter only six. Its source is in the Apennines, 4,430 feet above the sea and its mouth on the coast of the Ligurian Sea, the arm of the Mediterranean Sea north of Corsica. When the water is high boats may ascend the Arno as far as Florence, and in the Middle Ages Pisa was a maritime port of the first rank. The river valley, which bears the musical name *Val d' Arno,* is one of Italy's fairest regions. The total length of the river is about 150 miles.

ARNOLD, Benedict (1741-1801), an American general of the Revolutionary period, a brilliant man, for long beloved and trusted, yet whose ambition finally led him to betray his country. After his act of treachery, those who were seeking his arrest for treason said that it would be right to "bury with high military honors the leg which was injured at Saratoga and Freeman's Farm and hang the rest of him."

BENEDICT ARNOLD

Arnold was born in Norwich, Conn. He re-

ceived a fair education, and in 1762 went to New Haven, where he conducted a book and drug store, and later engaged in trade with the West Indies. At the outbreak of the Revolution he entered the army, and after the Battle of Lexington was sent to lead an expedition for the capture of Crown Point and Ticonderoga. On his way thither he met Ethan Allen with a company of soldiers devoted to the same purpose and after Allen had taken Ticonderoga, Arnold captured Saint John's. In the autumn of the same year Washington sent Arnold with 1,000 men to assist in capturing Quebec, and after his juncture with General Montgomery a combined attack was made. The American army was defeated, Montgomery was killed, and Arnold's leg was fractured. Congress promoted him to the rank of brigadier-general for his bravery in this campaign, and he showed that public confidence was not misplaced by his conduct during a naval battle on Lake Champlain in 1776.

In 1777 Congress appointed five major-generals for the army, all of whom were Arnold's juniors. He was stung by this injustice, and Washington wrote to assure him that he would endeavor to remedy "the error"; but when his claims were presented Congress voted him thanks, but did not promote him. In the same year Washington urged Congress to send Arnold north to head off General Burgoyne. Arnold consented to serve, and fulfilled his part in the campaign faithfully. He joined General Schuyler and led an expedition to relieve Fort Stanwix, which was besieged by a force of British and Indians, and then returned to the main army and took part in the decisive battle of Saratoga. There Burgoyne received from Arnold the quick stroke of arms which forced his surrender, although Gates received credit for the victory (see SARATOGA, BATTLES OF). Soon afterward Congress sent him his commission as major-general.

In 1778 he was appointed to the command of Philadelphia. He became involved in quarrels with the authorities of Pennsylvania and was tried by court-martial, but was acquitted of intentional wrong-doing, though in some respects his conduct was declared improper. The sentence was that he should receive a reprimand from the commander-in-chief. Washington discharged this duty with considerable reluctance and the greatest mildness, but the ambitious man had been hurt beyond endurance. In 1780, when he was given the command at West Point, he began at once to plan to surrender it to Clinton, with whom he had earlier had correspondence. His treachery became known through the capture of Major Andre, and Arnold escaped to New York City. He was given a British brigadier-general's commission and about $30,000 for losses he claimed to have suffered by joining the British. He remained in America a year, and led two British expeditions which resulted in the burning of Richmond, Va., and New London, Conn. In England, which was thereafter his home, he was kindly received by King George III, but met only scorn from the social and political world. He failed to obtain a commission in the army, and spent most of his remaining years as a merchant in the West India trade. His wife, faithful through all his troubles, cheered his last days, when he was burdened with debt, discouraged and an outcast from society.

A.MC C.

Consult Todd's *"The Real Benedict Arnold;* Spark's *Life of Benedict Arnold.*

ARNOLD, EDWIN, Sir (1832-1904), an English author, best known for his very popular *Light of Asia.* In 1861, after teaching for five years at Poona, in Bombay, he joined the editorial staff of the *Daily Telegraph,* with which he was connected for many years. His works include numerous translations from the Greek and Sanskrit and several volumes of narrative and lyric poems in addition to the *Light of Asia,* which is a poem presenting the life and teaching of Gautama, the founder of Buddhism.

ARNOLD, MATTHEW (1822-1888), an English author who ranks as one of the greatest of English critics. He was a son of Dr. Thomas Arnold of Rugby fame, a student at Rugby and at Oxford, and was for many years a British school inspector. Later he was for a time professor of poetry at Oxford. As both poet and critic, Arnold won high praise in his own day, and his reputation has grown steadily. While he does not appeal to as wide an audience as Tennyson or Browning, he may probably be ranked with them as one of the great poets of his age. Besides *Sohrab and Rustum* and his most popular poems, *Balder*

MATTHEW ARNOLD

Dead and *Tristram and Isolde,* he wrote many beautiful but shorter poems, among which are *The Forsaken Merman, Dover Beach* and *A Summer Night.* His *Thyrsis* stands with *Lycidas* and *Adonais* as one of the finest elegies in English. The bulk of his poetry is relatively small. Of his critical essays the best known are contained in the two series of *Essays on Criticism,* which continue to exert a real influence on criticism. Among his other prose writings are *Culture and Anarchy, On Translating Homer* and *Literature and Dogma.*

ARNOLD, THOMAS (1795-1842), a celebrated English scholar, clergyman and teacher, known to almost every child as the beloved headmaster in Hughes's *Tom Brown's School Days.* He was born at Cowes, Isle of Wight, studied at Oxford, and while there became known for the boldness and independence of his views and his excellent scholarship. His life work began when in 1827 he was elected headmaster of Rugby School, which position he held until his death. During his administration he completely revolutionized the methods of instruction and discipline and made such a strong impression upon other schools of England that many of them adopted his plan, and he is considered to have been the means of changing the system of education in the English public schools, such as Eton, Harrow, Winchester, and the like.

THOMAS ARNOLD

Arnold accomplished his work not so much by his direct teaching as by his influence upon his pupils and the ideals which he set before them. His main purpose was the development of character, and this he secured through his strong personality, thorough trust in his pupils, and the blameless life which he led. See RUGBY, for an account of the system of self-government among pupils which Arnold established there.

Consult *Tom Brown's School Days;* Fitch's *Thomas and Matthew Arnold and Their Influence on English Education.*

ARNPRIOR, *arn' pri er,* ONT., a town in Renfrew County, at the junction of the Madawaska and Ottawa rivers and on the Canadian Pacific and Grand Trunk railways, thirty-seven miles west of Ottawa. Arnprior has large lumber and woolen mills and several cheese factories. Marble quarries are not far away, and there are also lead and iron mines. The Ottawa River, which widens at Arnprior into Lac des Chats (that is, Cat Lake), provides good bass fishing. The town has a beautiful site overlooking the lake, and is well laid out. Population in 1921, 4,077.

AROMATIC, *air o mat' ik,* **PLANTS.** The word *aromatic* comes from a Greek word which means *spice,* and is applied to those plants which have a sharp, pleasant taste and a spicy odor. They are used in many ways—as a flavoring in various foods, as perfume and in medicine, either to disguise the unpleasant taste of drugs or to exercise some real or fancied medicinal power. These aromatic plants are numerous, and some of them are very well known, for they include cinnamon, cloves, vanilla, peppermint, thyme, sage, lavender, anise, caraway, ginger, sandalwood and many more. All are described in their alphabetical places in these volumes.

ARREST', the legal act which deprives a person of his liberty. The term comes from a French word meaning *to stop.* A sheriff, his deputy or assistant, a justice of the peace, a constable or any police officer may make arrests. A private citizen may arrest a person who has committed a crime or a breach of the peace in his presence and officers may arrest persons suspected of committing a crime. Arrests are seldom made in civil cases, but a person defrauding his creditors may be arrested.

Arrest does not necessarily deprive a person of his liberty, unless the crime for which he is held is of so serious a nature that it is not deemed advisable to give him his liberty. Otherwise he is allowed to furnish bail for appearance for trial. A person accused of murder is rarely admitted to bail (see BAIL).

A person under arrest on any charge is entitled to a hearing as speedily as the machinery of the law makes possible. If one believes himself unjustly accused he may apply to the court for a writ of *habeas corpus* (which see), which makes it obligatory upon his accusers to show cause for holding him.

If admitted to bail, the accused may enjoy full liberty until his case is called for trial, except that without express permission from those who furnish his bail he must not leave the jurisdiction of the court.

AR'ROWROOT, a delicate starch which is so easily digested that it forms one of the favorite foods for invalids and children. The chief difficulty in the way of its use is that it is very often adulterated with potato starch,

ARROWROOT

rice starch, or the starch of common white flour. Arrowroot is prepared from the root-stalks of several species of plants which are natives of tropical America but have been introduced into other warm countries. Most commonly the name is said to suggest the practice of the South American Indians, who use the freshly-cut roots to heal arrow wounds.

ARROWROCK DAM. See IDAHO, subhead *Irrigation.*

AR'SENAL, a plant owned by the government, where arms and munitions of war are manufactured, repaired and stored. *Naval arsenals* have to do with ships and their armament; those in the United States and England are called *navy yards.* Arsenals are usually located far from populous districts. They are gradually becoming simply storehouses for munitions made elsewhere, as private firms are increasing their contracts to supply various governments with arms.

The first arsenal in the United States was established at Springfield, Mass., in 1777, and the manufacture of rifles and other small arms is still carried on there. In 1917 the United States government maintained arsenals at Pittsburgh, Pa.; Augusta, Ga.; Benicia, Cal.; Columbia, Tenn.; Fort Monroe, Va.; Philadelphia, Pa.; Indianapolis, Ind.; Augusta, Me.; New York City (Governor's Island); Rock Island, Ill.; Jefferson Barracks, Mo.; Sandy Hook, N. J.; San Antonio, Texas; Dover, N. J.; Watertown, Mass.; Watervliet, N. Y., and Harper's Ferry, W. Va. Only at Springfield, Rock Island and Watervliet are manufacturing plants, the remaining arsenals being storehouses only.

On the outbreak of the War of the Nations arsenals and factories for the manufacture of munitions of war were established in all important commercial centers in Canada to meet the demands of the troops sent by the Dominion to the aid of Great Britain. Previous to this event there had been no permanent establishments of the kind in Canada.

ARSENIC, *ar' sen ik,* as most commonly understood, is a white crystalline powder which is one of the deadliest poisons known. It is estimated that more deaths are due to it than to any other poison. In reality, however, this should be called *white arsenic,* or *arsenious acid,* for it is a combination of oxygen with the true arsenic. This latter substance is a metallic element which is seldom found in a free state, but enters into combination with many other substances. It is of a dark-gray color, and readily tarnishes on exposure to the air, becoming first yellow and then black. It is as hard as copper, extremely bitter, and when burned gives off a smell of garlic.

This element itself is seldom used, but its compounds are valuable. The white arsenic mentioned above is a remedy for certain skin diseases and anaemia, but it should not be used without the advice of a physician because of its poisonous quality, even in small doses. In combination with copper it produces a vivid green color which is much employed in the arts, especially in the making of calico and wall-paper; but there are strong objections to such use, for it gives off tiny particles which are poisonous. Its use in coloring candies has been entirely prohibited. The specific known as "606," a standard remedy for syphilis, is an arsenic compound. See ANTIDOTE. W.A.E.

ARSON, *ar' sun,* in law, is the wilful burning of a dwelling-house or other building belonging to another person. By the common law arson is a crime; it is a capital offense, if any person is in the building at the time of firing, and if the act results in loss of life it is murder. To constitute arson in common law, the building burned must belong to another. However, burning one's own buildings for the purpose of obtaining insurance is nearly everywhere a penitentiary offense. But if there is no insur-

ance, and no injury to the property of another arises from the burning, the act is not considered a penal offense, although the sanity of one committing such an act might be made a subject of investigation.

ART AND THE ARTS. The word *art* brings to the mind a variety of work designed to please the eye and excite the esthetic emotions. To one person it may suggest a beautiful painting; to another, a graceful statue; to another, a noble cathedral. Beauty is almost always associated with it, but not all things that are beautiful are works of art. The traveler home from Europe will recall with equal pleasure the wonders of the Swiss Alps and those of the great paintings in the Louvre at Paris, but in the one case he will say that nature has given man a beautiful group of mountains; in the other, man has used his genius to produce objects of beauty for the happiness of his fellow-beings. Art, therefore, in a very broad sense, stands for those things which are the creations of man and not of nature. A work of art, then, is the product of man's intellect and imagination, as well as the work of his hands; in the words of Ruskin, "Art is the work of the whole spirit of man."

This word *art* is one of the most elastic in the language. The art of a people includes their sculpture, painting, architecture, etc., and each one of these branches is an art. Furthermore, the power to paint a picture, for instance, and the act of doing it are included in the term, as well as the rules that are observed. Art, however, does not discover the laws by which objects of beauty are created. This is the work of science, and a convenient way to distinguish these two fields of human endeavor is to say that science consists in knowing; art consists in doing.

Art has grown out of the vital needs of the human race. Primitive man needed tools to till the soil, dishes from which to eat and drink, weapons to use in hunting and warfare. At first he made the unshaped stone, a product of nature, do his work for him; then he learned how to shape it to adapt it to his needs; still later he discovered the uses of different metals and something of the effect of fire on these, and he learned how to mold clay vessels and how to bake them in the sun or in ovens. In the course of time he began to have a sense of pride in his achievements, and found satisfaction in making his tools and dishes beautiful as well as useful. He found that when the objects about him were harmonious in form and color and arrangement they gave him much more pleasure than when they were disharmonious, and so it has been his constant effort to secure that harmony or beauty.

Scope of the Arts. The use of the word *arts* has so widened that it now includes practically all of the industries that require skill in handwork, not only weaving, embroidering, pottery making and the like, but the various trades, such as carpentery, blacksmithing, etc. These are grouped under the name *useful,* or *mechanic arts,* while painting, sculpture, architecture, music and poetry—the arts of beauty—are known as the *fine arts.* Often it is difficult to set a hard and fast rule as to the use of the above terms, for in some of the arts, notably architecture, beauty and usefulness are inseparable.

B.M.W.

Related Subjects. The index that follows does not show the full extent of the treatment given to art in these volumes, for the details relating to the fine arts, sculpture, painting, architecture and music, are indexed under those topics. This list refers only to the more general articles:

Architecture
Arts and Crafts
Basketry
Bookbinding
Caricature
Cartoon
Cast
China Painting
Chinese White
Corcoran Art Gallery
Crayons
Daguerreotype
Drawing
Ecole des Beaux Arts
Embossing
Embroidery
Enamel
Engraving
Etching
Etruscan Art
Fine Arts
Gilding
Halftone
Intaglio
Japanning
Landscape Gardening
Lapidary
Lithography
Metallurgy
Mezzotint
Mechanical Drawing
Costuming
Mosaic
Music
Niello
Painting
Perspective
Photo-Engraving
Photography
Photogravure
Pottery
Rookwood Pottery
Sculpture
Stained Glass
Steel-engraving
Stencil
Stereotyping
Taxidermy
Vase
Wood-engraving
Wedgewood Ware
Zinc Etching

The following are artists, who cannot be classified under a specific heading, as painters, sculptors, cartoonists, or architects:

Christy, Howard C.
Cruikshank, George
DuMaurier, G. L. P. B.
Fisher, Harrison
Flagg, James M.
Gibson, Charles D.
Greenaway, Kate
Palissy, Bernard
Pennell, Joseph
Pyle, Howard
Shaw, Henry W.
Tenniel, Sir John

ARTEMIS, *ar' te mis,* the Greek name for the twin sister of Apollo, the virgin goddess whom the Romans called Diana.

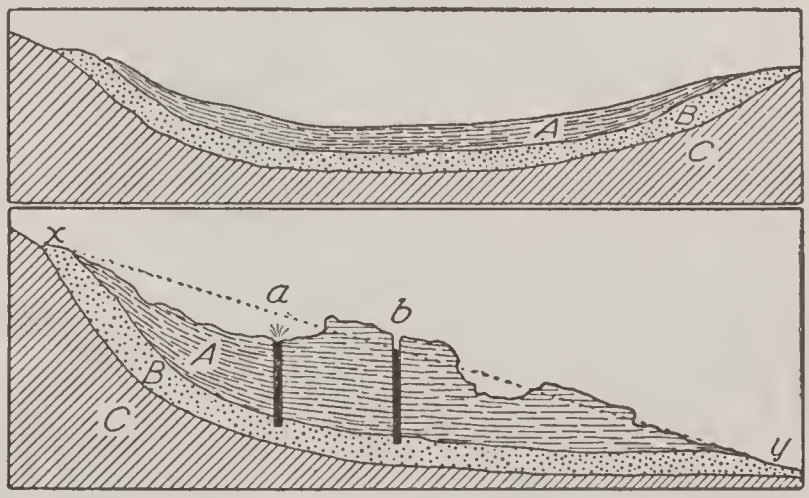
ARTERIES, *ar' te riz,* are tubes, or vessels, through which blood is pumped by the heart to various parts of the body. With the veins and capillaries they form the pipe-lines of the great circulatory system, of which the heart is the central pumping station. The details of the process by which the blood is sent to all parts of the body may be found in these volumes under the headings HEART and CIRCULATION OF THE BLOOD. The system of arteries begins at the heart. A large artery called the *aorta* (which see) rises from the left ventricle and carries pure red blood to the tissues of the body; from the right ventricle rises the *pulmonary* artery, which carries impure blood to the lungs. The aorta extends upward from the heart and then curves downward so as to form an arch. In the region of the abdomen it divides into the right and left *iliac* arteries; these are continued into the lower extremities, where they are known as the right and left *femoral* arteries. Branches of the femoral arteries form a network through the lower limbs. The right and left *subclavian* arteries spring from the aorta and extend to the shoulders, being continued in the *brachial* arteries of the arms. The head is nourished by two *carotid* arteries, and the heart by the *coronary* arteries.

The large arteries have three coats; these are a tough outer elastic coat, a middle muscular coat, and a smooth, thin, inner coat. As the arteries proceed from the heart they divide and subdivide into tubes which continually grow smaller until they become tiny capillaries (which see). These latter have but one coat, for their walls are merely an extension of the thin inner layer of the arteries. Blood from a cut artery flows out in spurts or jets, and is bright red in color. For methods of checking the flow of blood from a cut artery see BLEEDING, subhead *Arterial Bleeding.*

Hardening of the Arteries. Physicians declare that "a man is as old as his arteries." Changes in the composition of the blood, continuous use of alcoholic liquors, overeating, chronic indigestion, over-work of the heart, indoor occupations without sufficient exercise, worry, lead poisoning and disease of the kidneys cause hardening of the arteries. No remedy has been found for this disease, which often proves fatal. By avoiding the causes people usually live to a good old age without contracting the disease. The principal cause of hardening of the arteries in present-day American life is overeating of albuminous food, especially flesh, and the use of alcoholic drinks and tobacco. People who live temperately and who have reasonably regular habits of exercise and sleep rarely suffer from hardening of the arteries. The disease is never found in childhood or youth.

Blood pressure, which depends on the force of the heartbeat and on the character of the arteries, is an important factor in determining this disease. The small arteries are surrounded by muscle fiber, which, by contracting, can put the blood under severe pressure. Blood pressure is measured by several devices, which are operated on the following principle: By means of an inflatable rubber bag fastened around the upper part of the arm, the artery is compressed, the pressure being increased until the pulse at the wrist ceases to be felt. The point at which this occurs is noted on the mercury scale. When the tension is very high the blood pressure may read 300 millimeters, whereas it is normally 120 to 150. If a person finds that his blood pressure is increasing, which is evidence of hardening of the arteries, he should at once adopt a simple, rational program with temperance in everything and he can arrest the progress of the disease. W.A.E.

ARTESIAN, *ahr te' zhan,* WELL, a well formed by boring or drilling into a layer of porous rock which brings water from some



ARTESIAN WELL

Upper: Cross section showing underground relations of a water-bearing sandstone. *A* shows the overlying mass of clay, *B,* the stratum of sandstone, sand, or gravel through which the water flows, and *C,* the underlying impervious rock. *Lower:* Profile across an artesian basin showing hydrostatic grade, which determines the "head" or height to which the water will rise. The solid line is the land profile; the broken line the hydrostatic grade. In the diagram *A* is the overlying clay; *B,* the sandstone stratum; *C,* the granite, or impervious rock; *x* shows the point of intake, and *y* the outlet or springs; at any point below the dotted line *x a y,* or hydrostatic grade, the water will flow, while at points above the line, such as *b,* there will be no flow.

higher point. Such a layer, or *stratum,* is shown at *B,* in the upper illustration. The rain falls upon it where it is exposed, and seeps

inward, prevented by the harder rock below from going directly down. If a well is bored at any point between the outcropping ends, water will be forced up into it, perhaps flowing freely at the surface, according to the principles explained by the lower half of the illustration. The name artesian was formerly restricted to flowing wells, and is derived from the province of Artois, where this type of well was first popular.

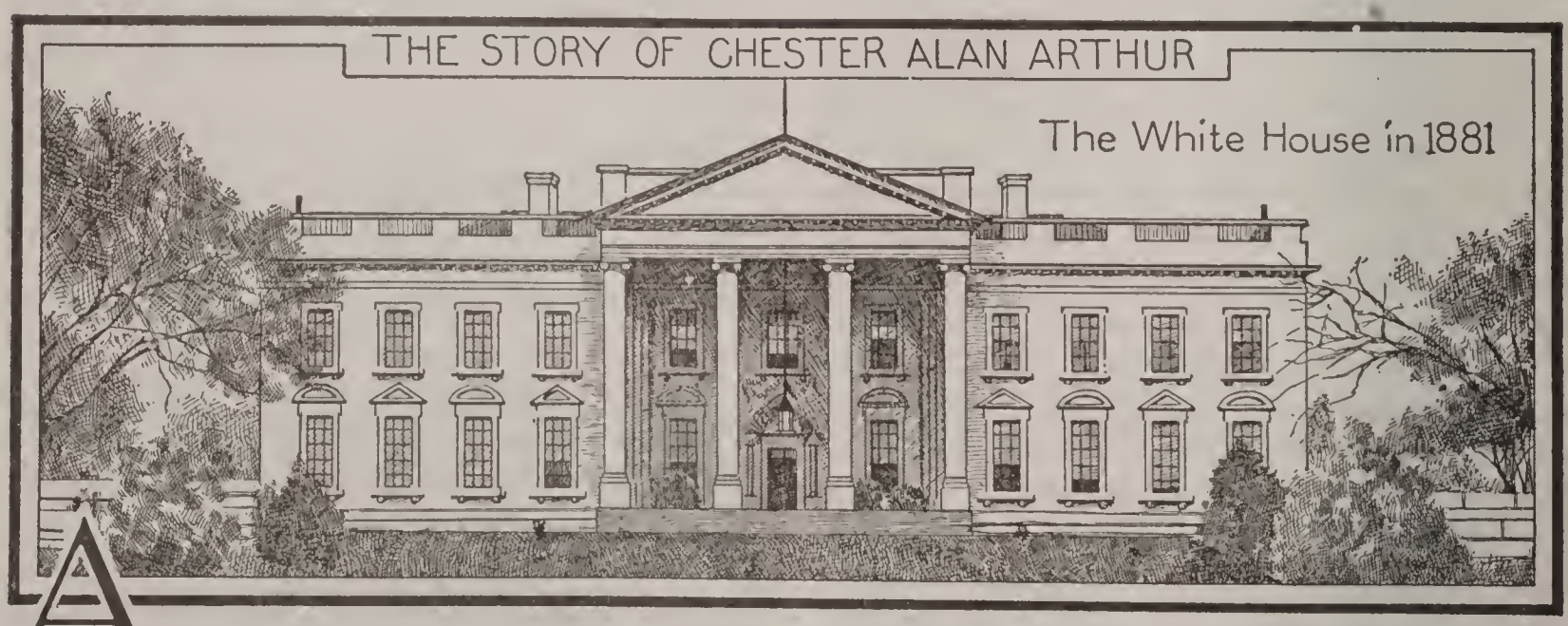
Most artesian wells supply pure drinking water, excellent for domestic purposes and for stock, though often containing minerals. Artesian wells are common in many regions where surface water of good quality is not easily obtained. In recent years a large number of them have been bored in New Jersey and other states east of the Appalachian Mountains, and many cities now obtain their supply of water from them. They are used extensively for irrigation in Iowa, Kansas, Colorado, Montana and Texas, and are numerous in South Dakota. Some wells are very deep. One in Pittsburgh, Pa., is 4,625 feet, and one in Galveston, Tex., is over 3,000 feet deep. The deepest well in the world is at Leipzig, Germany, 5,735 feet. For the method of sinking artesian wells, see WELL BORING.

ARTHROPODA, *ar throp' o da.* This term, which comes from two Greek words meaning *jointed foot,* is used to describe a very large family of the animal kingdom, all the members of which are characterized by having jointed appendages. The arthropods range from the tiny beach fleas and water fleas to the lobsters and king crabs, and include the spiders and scorpions, the cockroaches, grasshoppers and dragon flies, and the beetles, bees, butterflies, gnats and flies, so it may be readily believed that this is by far the largest of all the animal families. The bodies as well as the appendages are in joints or segments, and in typical forms each segment carries a pair of the appendages, which have special functions to perform. Most of these are used for walking, but some are suckers, some are jaws and others are organs of sense or offensive or defensive weapons.

The arthropods have an external skeleton or shell, though in some members of the family, as the flies or moths, this is so soft as scarcely to deserve the name. In others, as the lobsters, it is very hard and strong. All have an organ which resembles a heart; a well-organized nervous system, and simple or compound eyes. See CRUSTACEA; MYRIAPODA; INSECTS, and the articles therein referred to, with their various illustrations. Read also, in this connection, the article ZÖOLOGY.

Related Subjects. For a detailed discussion of the animal forms belonging to this great group, see the following articles, and the lists included under some of them:

Arachnida	Lepidoptera
Crustaceans	Myriapoda
Hemiptera	Neuroptera
Insect	Orthoptera



ARTHUR, CHESTER ALAN (1830-1886), the twenty-first President of the United States, one of the five men who have become President without being elected to that office; the others were Tyler, Fillmore, Johnson and Roosevelt. In the campaign of 1880 the Republican party was divided; one faction, led by Conkling and Platt, favored the nomination of Grant for a third term; the other was willing to unite on any man to defeat Grant. The man chosen was James A. Garfield, but to appease the defeated Conkling faction the Republicans nominated for Vice-President Chester A. Arthur, one of Conkling's chief

lieutenants. Through the tragic death of Garfield, Arthur became President.

Previously, even as Vice-President, he had won an unenviable reputation for his activity in partisan politics, and he was commonly considered a clever lawyer and politician who was working chiefly for his own interests. To his credit, however, stands the record of his Presidential administration, for the new responsibilities thrust upon him worked a great change in his character. Though his term was not marked by brilliance or events of dramatic significance, Arthur proved himself one of the fairest, most honest and fearless of Presidents. So clear is the division in his career that his life is best treated in two sections.

Early Life and Rise to Power. Chester Alan Arthur was born on October 5, 1830, at Fairfield, Vt. William Arthur (1796-1875), his father, a native of County Antrim, Ireland, was a teacher and Baptist minister who seemed unable to remain for long in any community; he lived at various times in Vermont and in Quebec. These family wanderings nearly cost his son the Presidency, for in 1880 it was charged that Arthur was really born in Canada. It is now evident, however, that Fairfield was his birthplace. His mother was an American, Malvina Stone, who was living in Canada when she met and married William Arthur.

Young Chester seems to have suffered nothing from the family wanderings, and at the age of fifteen entered Union College, Schenectady, N. Y., as a sophomore. After his graduation with honors in 1848, he taught school for several years, using all his spare time to study law. In 1853 he entered a law office in New York City, and within the next six or seven years won for himself a leading position at the bar. He was associate counsel for the state in the Lemmon case, in which the state courts held that negro slaves brought into New York, even while on the way from one slave state to another, became free as soon as they set foot in New York. In another famous case he won equal rights for negroes and whites in the street cars of New York City.

For two decades he was a successful practicing lawyer, and at the same time was active in Republican politics. During the first two years of the War of Secession he rendered excellent service as inspector-general and quartermaster-general of the New York troops. After the war he continued his political activities, worked for the election of Grant to the Presidency, and was rewarded in 1871 with the position of collector of the port of New York. The customs service was honeycombed with dishonesty and inefficiency; appointment to it was usually a reward for votes delivered at a previous election. General Arthur was opposed to civil service reform, and managed his office according to the time-honored principle, "To the victors belong the spoils." It is true, however, that Arthur made fewer removals and appointments for political reasons than any of his immediate predecessors, and his business management was never questioned.

When President Hayes in 1877 undertook the reform of the civil service he began with the New York Customs House. The report of an investigating commission recommended numerous changes in its organization, and President Hayes demanded the resignation of Arthur and his two principal subordinates. Although Arthur admitted the existence of the evils, he refused to resign because he felt no personal guilt. The abuses were the result, he claimed, of a system for which he should not bear the blame. Arthur was vigorously defended by Senator Conkling, but during a recess of the Senate he was removed by the President, on July 11, 1878. Early in 1879 this action was approved by the Senate, after violent controversy.

CHESTER ALAN ARTHUR
Vice-President, who by the assassination of President James A. Garfield, became the fourth "accidental" President of the United States.

In the Republican national convention of 1880 Arthur was a delegate-at-large from New York, and worked hard for the nomination of General Grant for a third term. Garfield, however, was nominated for President, but the Grant-Conkling faction were allowed to name Arthur as candidate for Vice-President (for details of the campaign and election, see GARFIELD, JAMES ABRAM). Immediately after his inauguration as Vice-President Arthur sided with Conkling against the President in the great fight over the patronage in New York (see CONKLING, ROSCOE). The assassination of Garfield occurred in July; he died in September, and on September 19, 1881, Arthur became President of the United States.

The Administration of Arthur. The death of Garfield at the hands of a disappointed office-seeker gave a new impetus to the movement for civil service reform. A National Civil Service Reform League was organized under the presidency of George William Curtis, and in 1883 Congress passed the Pendleton Civil Service Act, which provided for a classified list of government employees and promotion after competitive examination. Though previously an advocate of the spoils system, President Arthur gave the new system his earnest support.

The Tariff. For a decade after 1879 the United States had a steadily-growing surplus in the treasury. This condition led first to extravagant and wasteful appropriations, such as the Rivers and Harbors Act of 1882, which Congress passed over the President's veto. This bill appropriated about $18,000,000 for "improvements" which were nothing more or less than sops handed to the voters of certain districts to influence the reëlection of Representatives. The second effect of the surplus was to strengthen the demand for tariff reduction. The report of a preliminary commission recommended a reduction in duties of twenty to twenty-five per cent, but the law of 1883, when finally approved, actually increased the most important revenue-producing duties. It did make large reductions in internal revenue taxes, but was unsatisfactory to both parties.

Other Legislation. Two other important laws deserve consideration, the Edmunds Anti-Polygamy Act and the Chinese Exclusion Act, both passed in 1882. The Edmunds Act prohibited polygamy in territories of the United States, and was directed principally at Mormons (which see). The Chinese Exclusion Act was passed as the result of the agitation against cheap foreign labor, which it was claimed would prevent American workmen from obtaining a living wage. It forbade the immigration of Chinese for ten years, and prohibited naturalization of Chinamen already in the United States.

Prosperity of the South and West. The industrial progress of the New South was demonstrated at the Atlanta Cotton Exposition in 1881 and the New Orleans Cotton Centennial Exposition in 1884. The cotton crop had increased from fewer than 5,000,000 bales a year to more than 8,000,000, and the South had also begun to raise greater quantities of wheat, corn, early fruits and vegetables. There was also a marked advance in manufactures, and in Alabama mining suddenly became a great industry. The West, too, was making rapid strides, and three transcontinental railroads were completed. Previously the Union Pacific had been the only great road to the Pacific coast, but now there were completed the Southern Pacific in 1881, the Northern Pacific in 1883, and the Atchison, Topeka & Santa Fé in the same year.

Miscellaneous Events. Arthur's administration was marked by at least two events whose results now are taken as a matter of course by every American. One of these was the reduction of the postage on letters from three cents to two cents an ounce; the other was the adoption of the system of standard time (which see). The Brooklyn Bridge, at the time of its completion regarded as one of the wonders of the world, was opened in 1883, and Alaska was established as a territory in 1884. An event of national importance was the organization of the American Red Cross Society in 1881, under the presidency of Miss Clara Barton.

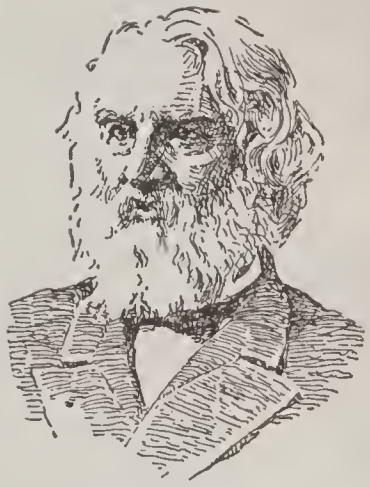
Presidential Campaign of 1884. President Arthur did not entirely escape the consequences of his long association with partisan politics in New York state. His intimate friend and Secretary of the Treasury, Charles J. Folger, was defeated for governor of New York in 1882, largely as a protest against the methods of the Republican party managers. In 1884 Arthur allowed his name to be presented to the Republican convention, but he was easily defeated by James G. Blaine. This defeat was due not primarily to any faults attributed to Arthur, but rather to the ambitions of other Republicans. The Democrats nominated for President the governor of New York, Grover Cleveland, who had defeated Folger in 1882.

ADMINISTRATION OF ARTHUR

1881 — 1885

Emerson
Died in 1882

Washington Monument
Dedicated in 1885



Longfellow
Died in 1882

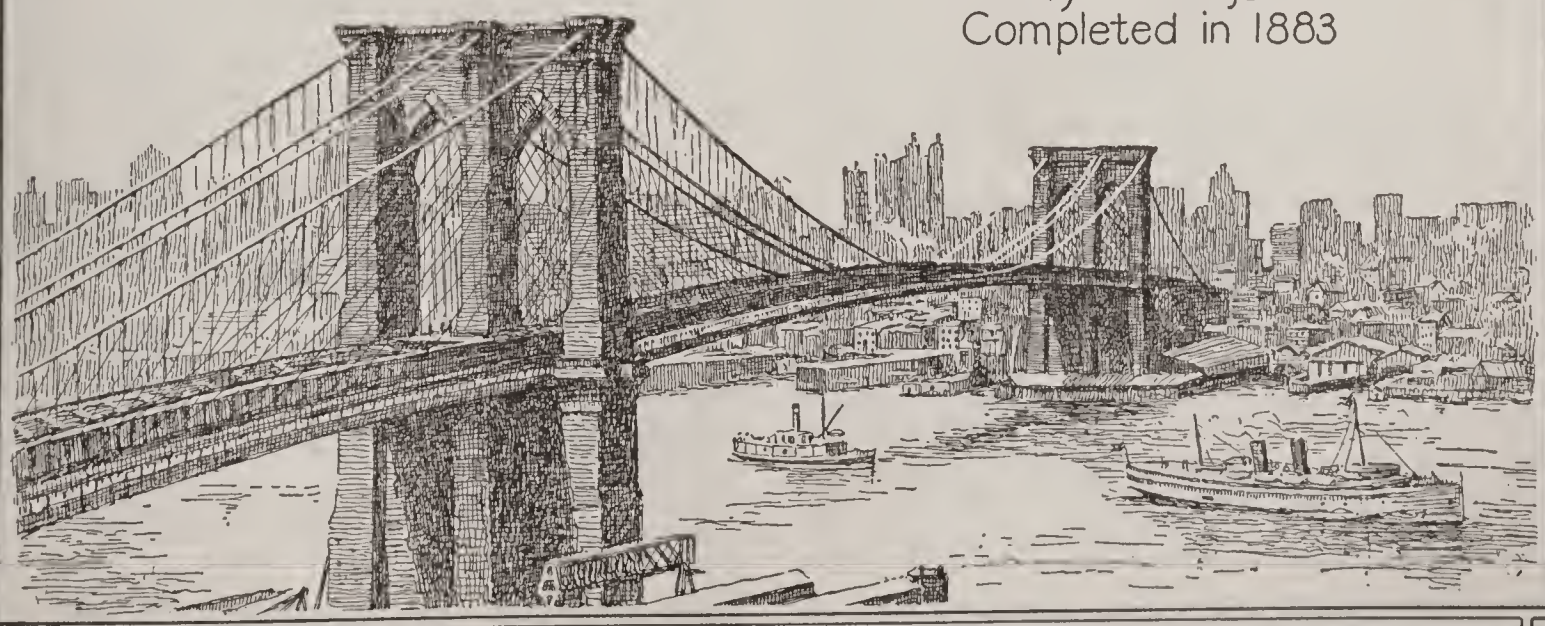
Alaska
Territorial Government
Organized
1884

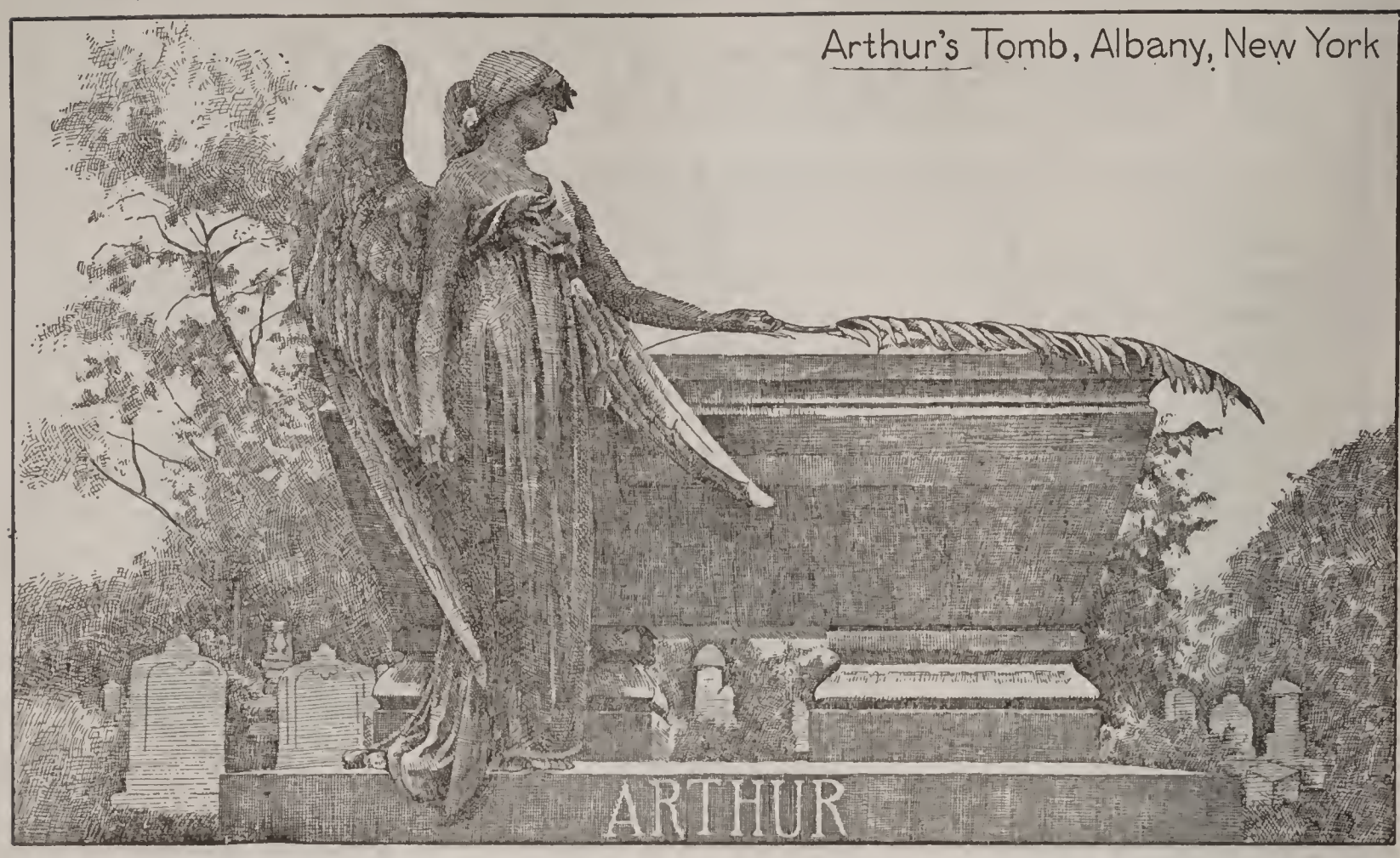
Red Cross Society
Organized in 1881

Two Cent Postage
Adopted
in 1883

Standard Time
Adopted in 1883

Brooklyn Bridge
Completed in 1883





In the campaign that followed there was much bitterness and charges and countercharges filled the air. The political issues were subordinated to the personalities of the candidates. The results of the election are summarized below:

RESULT IN ELECTORAL COLLEGE			VOTE	
Candidates	Party	States	Popular	Electoral
Grover Cleveland	Democratic	20	4,911,017	219
James G. Blaine	Republican	18	4,848,334	182
John P. St. John	Prohibition	—	151,809	—
Benjamin F. Butler	Greenback	—	133,825	—

Arthur, defeated for the nomination, gave his support to Blaine, although the two men had been political foes for years. At the end of his term Arthur retired to New York City, where he died on November 18, 1886.

Other Items of Interest. When President Arthur signed the bill making Alaska a territory, that region was still thought of as "Seward's Folly." It then had only 400 whites in its population; in 1910 it had increased to over 36,000.

The two-cent postage rate at first applied only to letters of a half-ounce or less. In the next administration the limit was made one ounce, as it stands now. The reduction from three cents did not lessen the post office revenues, even in the first year.

Another venture of President Arthur's Postoffice Department was the introduction of postal notes, which were abandoned in 1894.

In 1881, the year that both Garfield and Arthur were inaugurated, immigration broke all records. In the next year there were 788,992 arrivals, more than in any year till 1903, and more than in several years since then.

The Northern Pacific, the second of America's transcontinental railroads, was completed in 1883.

While Arthur was Vice-President his party had a bare majority in the lower house and depended on his own vote in the Senate. After the elections of 1882 there was a Democratic majority of more than eighty in the House and a Republican majority of four in the Senate.

President Arthur was tall and well-formed, a man of such distinguished presence as to be noteworthy in any assemblage.

His friends and family were devoted to him, and his kindly, affable manner won him the enthusiastic regard of those who knew him less well.

He took the oath of office as President in his own home on Lexington Avenue, New York City, but later he repeated it in the Vice-President's room of the Capitol at Washington.

OUTLINE AND QUESTIONS ON CHESTER A. ARTHUR

Outline

I. Early Life

(1) Birth and parentage
(2) Education
(3) Practice of law
(4) Defense of negroes

II. Political Career

(1) Collector of the port of New York
(2) Opposition to civil service reform
(3) Republican national convention of 1880
(4) Elected Vice-President

III. Administration

(1) Legislation
  (a) Chinese Exclusion Act, 1882
  (b) Edmunds Anti-Polygamy Act, 1882
  (c) Tariff Act of 1883
  (d) Pendleton Civil Service Act, 1883
(2) Other governmental affairs
  (a) Alaska made a territory
  (b) Bureau of Labor organized
  (c) Two-cent postage adopted
  (d) Standard Time system introduced
(3) Other events
  (a) Three transcontinental railways completed
  (b) American Red Cross Society formed
  (c) Brooklyn Bridge built
  (d) Deaths of Emerson and Longfellow
  (e) Prosperity of the South
    1. Atlanta Cotton Exposition
    2. New Orleans Cotton Centennial Exposition
(4) Election of 1884
  (a) Candidates
  (b) Issues
  (c) Result

Questions

Why was it easier to get from the eastern to the western coast of the United States at the close of Arthur's administration than at the beginning?

What was the "spoils system" of which he was an advocate during his early political career?

What reform undertook to do away with it?

Why was Arthur chosen for Vice-President?

What tendencies of the time were shown by the Rivers and Harbors Act and how did the President regard the act?

What two measures were introduced by the Postoffice Department during this administration? Have they proved successful?

How did the elections of 1882 and 1884 express the country's opinions?

Did the President's party control Congress?

How did he attract public attention during his term as Vice-President?

Why was Alaska called "Seward's Folly"?

What step was taken during this administration in regard to Alaska, and was it considered a great event?

What was the most important measure passed by Congress at this time?

How did the story of Arthur's father figure in the campaign of 1880?

What was done to the tariff in this administration?

What labor law did President Arthur sign?

How many men besides Arthur ever became President without having been elected to that office? Who were they?

What showed the prosperity of the South during this administration?

What "wonder of the world" was completed during Arthur's term?

His tact and his breadth of view were shown on the occasion of the dedication at Yorktown, Va., of a monument to commemorate the surrender of Cornwallis. On that occasion he ordered a salute fired in honor of the British flag "to show the respect entertained by the American people for the illustrious sovereign and gracious lady who sits upon the British throne."

On October 29, 1859, Arthur married Ellen L. Herndon, who died the year before his election to the Vice-Presidency, leaving two children.

One of the five statesmen mentioned in the above article as being elected Vice-President and coming into the higher office on the death of the President—Theodore Roosevelt—unlike the others, was at the next election chosen for a full term. W.F.Z.

Consult Stoddard's *Life of Chester A. Arthur;* Smalley's *Life of Chester A. Arthur.*

ARTHUR, Sir George (1784-1854), a British colonial administrator, lieutenant-governor of Upper Canada from 1837 until the union of Upper and Lower Canada in 1841. After winning distinction during a ten-year career in the army, he was in 1814 appointed lieutenant-governor of British Honduras, and from 1823 to 1837 was lieutenant-governor of Tasmania. His success in dealing with disturbances in Tasmania led to his appointment in 1837 as lieutenant-governor of Upper Canada, where the rebellion led by William Lyon Mackenzie had just been suppressed. Arthur determined to punish all the rebels severely. Two of them were executed, the jails were filled with prisoners, and only the interference of the British government prevented further executions. Arthur made the mistake of attempting to deal with Canadians as he had dealt with the Tasmania colonists, many of whom were ex-convicts. As governor of Bombay from 1842 to 1846 he helped to place British rule in India on a firm basis.

ARTHUR, Julia, the stage name of Ida Lewis (1869-), a Canadian actress, born in Hamilton, Ont., best known for her performances of Rosalind in *As You Like It* and of other Shakespearean characters. She made her first professional appearance on the stage at the age of fourteen as the Prince of Wales in Shakespeare's *Richard III.* After meeting with much success in this and other parts she became in 1895 a member of the company headed by Sir Henry Irving and Ellen Terry, with whom she played for several seasons, both in England and America. In 1898 she married B. P. Cheney, Jr., and two years later retired from the stage. In 1916, after an interval of sixteen years, she again played in Shakespearean rôles, on the occasion of the celebration of the ter-centennial of Shakespeare's death. In the same year she was the star in *The Eternal Magdalene.*

ARTHUR, King, the great national hero of the Britons, said to have reigned as their king in the sixth century. He married Guinevere, a royal princess, and set up his court at Caerleon-on-Usk, in Wales. There the king and his knights used to gather about a circular marble table in the hall of the palace, and these became celebrated as the Knights of the Round Table. King Arthur drove out the invaders of his country, brought peace and order to the land, and his knights went about doing good. See Round Table, Knights of, for illustration.

The king was an example to his people of purity and righteousness; some of his knights remained evil and treacherous, however, and while he was absent on an expedition to Rome, Modred, his nephew, stirred up a rebellion. In his contest with the rebellious knights on his return, Arthur was mortally wounded. He was carried away to an island of Avalon to be healed, and for a long time the Britons in the generations which followed believed that he would return and again establish his righteous rule. This story of Arthur is supposed to be part history and part legend. It has been used as a basis for many poems, notably Tennyson's *Idylls of the King* (which see). Lowell makes his Sir Launfal in the poem of that name one of Arthur's knights.

THE ARTICHOKE

ARTICHOKE, *ar' ti choke,* a thistle-like plant used in some countries as a vegetable. The stem is two or three feet high and bears sev-

eral branches, on the ends of which are large heads of blue and white flowers. The leaves are large and prickly. Surrounding the flowers are thorny, oval scales, which overlap each other. Portions of the flower heads are eaten raw as a salad, or boiled in salted water and served with melted butter or sauce. The plant is well liked by the people of Europe, but has not been in general use as a food in America except for live stock. However, its popularity is slowly increasing. The Jerusalem artichoke is a species of sunflower that grows in Canada and the upper Mississippi Valley. Its roots are used like potatoes.

ARTICLE, *ar' ti k'l.* There are two articles in English grammar—*the* and *a (an)*—and they classify as *limiting adjectives,* because they point out, without describing. At one time they formed a separate part of speech, making nine instead of eight, as now taught by grammarians.

Originally the word *a* or *an* meant the same as *one*—a meaning still preserved in such expressions as *two of a kind, nearly of a size, three at a time,* and the like. In its present usage, however, it does not emphasize number but is closely akin to the word *any;* that is, *a dog* refers to any member of the dog family. Therefore *a* and *an* are called the *indefinite articles. The,* on the other hand, is a weakened form of *that,* and because it points out in a more definite way it is called the *definite* article. *The dog* means the particular animal under discussion or about which something is to be asserted; or it may mean dogs as a class, as in the sentence, "The dog is man's staunchest friend." *The* may also be used to emphasize supremacy; as, "This is *the* novel of the year."

When to Use "An." Until the middle of the twelfth century, the article had only one form—*an*—but about that time people began to drop the *n* before words beginning with a consonant sound. This tended to make speech more euphonious. The rule, however, was not always observed, for in the *Canterbury Tales* Chaucer writes, "Thou lookest as thou wouldst find *an* hare," and in Shakespeare and the Bible are expressions like *an usurer* and *an one,* where spelling rather than pronunciation dictated the form of the article.

The present rule is, "Use *an* before a vowel sound and *a* before a consonant sound." This means that a word beginning with silent *h* is considered to begin with the vowel that follows it, and one beginning with *e* or *eu* sounded like *yu* is considered to begin with a consonant. Thus:

An apple
An action
An exception
An old shoe
A plum
A deed
A rule
A new ulster
An heir
An honor
An unused book
An uphill climb
A hero
A humble home
A used book
A European tour

Many of the older text-books teach that it is necessary to use *an* before words beginning with *h* and accented on the second syllable; as, *an* hysterical woman, *an* historical novel, *an* habitual criminal, *an* hereditary crown. Some modern texts do not endorse the older form.

Pronunciation of "The." In the interests of euphony, a slight variation is made in the pronunciation of the definite article. The *e* is given a longer sound before a vowel and is somewhat blurred before a consonant; as, *thee* orange, *thuh* lemon.

Articles Used as Other Parts of Speech. In the expression, "The sooner the better," *the* is not an article but an adverb, modifying the adverbs *sooner* and *better;* the sentence being a short form for, "The sooner we go the better I shall like it," or something equivalent. Similarly, *a* is used as part of an adjective phrase in "many a man" and as a preposition in the Baby Bunting line, "Papa's gone a-hunting." Here and in similar expressions like *a-flying, a-whistling,* and the like, the *a* replaces an old preposition, *an,* meaning the same as our *on.*

Repetition of the Article. When a boy announces, "I have a brown and a white dog," his hearers are justified in crediting him with being the master of *two* dogs, one brown and the other white. If he says, "I have a brown and white dog," he means, if he is careful about his English, that he has only *one* dog, a mixed brown-and-white in color. Similarly, we are correct in saying, "She is the wife and mother," referring to a woman accompanied by her husband and children; and "The wife and the mother of Senator Harper were both present at the reception," since two different women are involved. Again:

A novelist and artist named DuMaurier was the author of *Trilby.*

A novelist and *an artist* were appointed on the committee.

We are studying the life of Burbank, *the seientist and plant-breeder.*

We are studying the life of *the great seientist, Mareoni,* and *the famous plant-breeder, Luther Burbank.*

The manager and bookkeeper, Mr. Smith, is in charge of that work.

The manager and the bookkeeper favored different methods of classifying the accounts.

The rule involved in all these examples is that the article is not repeated before each of two or more connected nouns when they refer to the same person or object; it *must* be repeated if different persons or things are meant. The seeming contradiction in such sentences as "He spoke of Washington, the soldier, the patriot, the statesman," is explained by the fact that the repetition of the article gives additional emphasis. The statement is perceptibly weaker if made to read, "He spoke of Washington, the soldier, patriot and statesman." Macaulay makes use of this rhetorical effect in the sentence, "James was declared a mortal and bloody enemy, a tyrant, a murderer and a usurper."

When the Article is Superfluous. "The spider is not an insect but a curious kind of *an* animal." The italicized article is superfluous because *a* refers to *one of a class* and therefore cannot be used with a word referring to an entire class, such as *kind, sort, species* or *variety*. The correct form is, "The spider is not an insect but a curious kind of animal." We say, "I had the same sort of experience," "This is an unusual species of fern," and so on. The article is also superfluous before a word taken simply as a name. Thus, it is incorrect to say, "He does not deserve the name of *a* father"; "Cromwell was given the title of *a* Protector." These sentences should read, "He does not deserve the name of father"; "Cromwell was given the title of Protector."

The article is incorrectly used in such sentences as, "Barrie's *The Little Minister* is a popular and charming book," for the reason that an article cannot properly come between a possessive and the word it governs. The correct form is, "Barrie's *Little Minister* is a popular and charming book," or, possibly better, "Barrie's novel, *The Little Minister,* is a popular and charming book."

Parsing the Article. The points to be covered are its classification and the noun it modifies. In the sentence, "The sublime is in a grain of dust," the articles would be parsed as follows:

The is a limiting adjective, called the definite article, and modifies the adjective *sublime* used as a noun to denote an abstract idea. *A* is a limiting adjective, called the indefinite article; the form used before consonant sounds; modifies the noun *grain,* referring indefinitely to one grain out of an entire class.

Common Errors. The rule explained in the paragraph entitled *Repetition of the Article* is the one most frequently violated, but the construction appears in so many different forms that a few additional examples will be found helpful. Other frequent mistakes are also included in the following list:

I read the first and last verse, for *I read the first and the last verse* (or, *the first and last verses*). Where different things are referred to, the article must be repeated where the noun is singular; only the first adjective requires the article where the noun is plural.

The young and old doctor occupied the same suite, for *The young and the old doctor occupied the same suite.* The same man cannot be both old and young; since different persons are implied, the article must be repeated.

Either witness or lawyer had made a blunder, for *Either the witness or the lawyer had made a blunder.* This omission of the article is a common error leading to actual obscurity in the thought, for the sentence in its first form seems to imply that there are two witnesses and no lawyers.

The plumber and carpenter were already on the job, for *The plumber and the carpenter were already on the job.* Since the plural verb implies two different men and not one man doing both the plumbing and the carpentering, the article calls for repetition.

The thought is more clearly brought out in the Latin and Greek version, for *The thought is more clearly brought out in the Latin and the Greek version* (or, *in the Latin and Greek versions*). The same thing cannot be both Latin and Greek.

If such an one is present, let him step forward, for *If such a one is present, let him step forward. One* being pronounced as though spelled *won,* properly takes the article *a.*

I have no patience with that kind of a mistake, for *I have no patience with that kind of mistake.* The insertion of *a* makes the mistake particular, limiting it to *one* of a class, whereas the word *kind* has the opposite meaning of an entire class.

The diphtheria is a dangerous disease, for *Diphtheria is a dangerous disease.* The definite article can be used only when a particular person or thing is pointed out. It is not required before a word taken in a general sense. L.M.B.

Outline on the Article

I. Origin and meaning of *a* and *the*
II. When to use *an*
III. Pronunciation of *the*
IV. Articles used as other parts of speech
  (a) Adverb
  (b) Adjective
  (c) Preposition
V. Repetition of the article
  (a) Rule and examples
  (b) Exception for rhetorical effect
VI. When the article is superfluous
  (a) After *kind of*
  (b) After *name, rank* or *title of*
  (c) After a possessive
VII. Parsing the article
  (a) Two essential things to tell
  (b) Type sentence
VIII. Common errors

ARTICLES, THE THIRTY-NINE, the statement of the religious beliefs of the members of the Church of England. They are based on 42 articles drawn up in the reign of Edward VI (1551) by a commission of eight bishops, eight clergymen, eight civilians and eight lawyers, Ridley, Cranmer and Coverdale being among the number. Queen Mary would not acknowledge them, but under Elizabeth, Archbishop Parker revised them, reducing them to thirty-nine. They were confirmed by the queen in 1563, and were ratified anew in 1604 and 1628. By the Clerical Subscription Act of 1866, the clergy do not have to sign these articles, but declare their belief in them and in the Prayer Book. Since 1871 members of Oxford and Cambridge Universities are not obliged to sign them. The thirty-nine articles are now accepted by the Episcopalian churches of Scotland, Ireland and America.

ARTICLES OF CONFEDERATION, the written instrument of government adopted in 1781 by the thirteen American colonies, or new states, who were then fighting for independence. It took a brief experience with this form of weak confederation to prove that a strong government was impossible under such a basic law, but out of the trials and mistakes of this "critical period of American history" were born a new Constitution and a new nation, the United States of America.

The reasons for the failure of the Confederation were numerous, but they may be summed up in the statement that each of the states was an independent country, and the thirteen states merely formed a more or less "firm league of friendship with each other" (Article III). Article II stated expressly that "Each state retains its sovereignty, freedom and independence, and every power, jurisdiction, and right which is not by this Confederation expressly delegated to the United States in Congress assembled."

The government under the Confederation was in the hands of Congress, which included not less than two nor more than seven delegates from a state, each state having, however, but one vote; the vote of each state was cast as the majority of its delegates decided. Congress could decide disputes between the states. It had no power to regulate commerce or to raise revenue; it could declare war, but could not raise troops; it could make appropriations, but could not collect taxes; it could pass laws, but could not compel their observance; it could borrow money, but could not guarantee its repayment. When Congress was not in session the government was administered by a "committee of the states," composed of one delegate from each state.

The Articles of Confederation were drawn by a committee of Congress appointed on the same day as was the committee to draw up the Declaration of Independence. The Articles were reported to Congress July, 1776, but they were not adopted until November, 1777. They were then submitted to the state legislatures, whose unanimous consent was necessary to make them effective. By May, 1779, twelve of the states had ratified the Articles, but Maryland demanded that New York, Virginia, Connecticut and the other states give up their claims to the lands west of the Alleghany Mountains. Not until all the states had agreed to cede their claims to the Federal government did Maryland ratify the Articles, on March 1, 1781. Thus the Revolutionary War was almost over before the states could agree on a form of government. See ANNAPOLIS CONVENTION; CONSTITUTION OF THE UNITED STATES.

The text of the Articles of Confederation, too long to be inserted here, may be purchased for five cents from Directors of the Old South Work, Old South Meeting House, Boston. E.D.F.

ARTICULATION, *ar tik u la' shun,* in anatomy, is a term applied to the joining of the bones. This process is described in the article JOINTS (which see).

Articulation, in speech, is clear and distinct utterance. The principles of articulation as taught in schools are briefly set forth in the well-known lines—

> Speak clearly if you speak at all—
> Carve every word before you let it fall;

and Shakespeare put into the mouth of Hamlet advice on the subject by which others besides players might profit:

> Speak the speech, I pray you, as I pronounced it to you, trippingly on the tongue; for if you mouth it as many of your players do, I had as lief the town-crier spoke my lines.

People who do not articulate clearly usually fail to bring out the sounds of the consonants in words, or certain syllables, as the *ing* in *depending* or *exceedingly.*

ARTIFICIAL, *ar ti fish' al,* **LIMBS,** limbs made to supply the place of those lost by accident or in war. From the very earliest days those who have lost arms or legs have endeavored by artificial means to replace them, but it is only within recent years that the manufacture of limbs has developed into a science. In the United States, prior to the War of the

Nations, such development had gone further than in any other country, but Europe's vast needs in this direction led to notable perfection in the art of limb making. As the cost of artificial limbs would be beyond the means of many of the maimed soldiers in the War of the Nations, the various governments supplied them to those who suffered loss of arms or legs. The United States set the example in this matter by supplying the maimed veterans of its wars with artificial limbs, which are renewed every five years. Artificial legs, arms, eyes and even ears and noses are now made with wonderful skill, both in Europe and America.

Artificial legs are usually made of strong, light wood, or aluminum, with certain portions, such as the soles of the feet, of rubber. When amputation is necessary, surgeons carefully consider how best to fit the remaining stump of arm or leg to the requirements of an artificial limb. A leg is made with joints at knee and ankle, to allow of a natural swing when walking, and are attached by means of a hollow portion surrounding the stump to which it is laced. Arms are fitted at the shoulder, attached to a corset, or below the shoulder with bands around the stump. Elbow joints are provided, and hands which with the aid of springs can be made to perform many duties, such as holding a pen or clasping a piece of

ARTIFICIAL LIMBS

(*a, a*) Shape when amputation is above the knee; (*b*) wood and rubber foot; (*c*) shape when amputation is below the knee.

paper. Sometimes a hand has a socket in which a knife or fork can be held. The hand usually is removable and can be replaced by a hook screwed into the arm socket and capable of supporting considerable weight. Artificial arms and legs made on the latest scientific principles may now be obtained for a sum varying from $30 to $60.

The making of artificial eyes requires great care and is a delicate operation. A shell of glass is molded and made to the exact size required; then pieces of colored glass are worked into it in exact imitation, even to tiny blood-

ARTIFICIAL ARM

vessels, of the eye it is to match. An ear is made of *papier-mache* or metal, painted in natural colors and supported in its place by a spring passing over the head. An artificial nose is molded of papier-mache and held in place by spectacles or clamped to the remaining stump. In the manufacture of all artificial limbs the greatest care is taken to ensure a perfect fit, as on that depends entirely the comfort, and often the health, of the wearer. A limb well fitted enables the wearer to use it with a good degree of satisfaction. In case of a leg, if the natural knee joint is saved, a person can walk with sometimes only the least perceptible defect; when amputation is above the knee the peculiar swing of the wooden leg to bring the knee joint to a straight angle discloses the wearer's affliction. F.ST.A.

ARTILLERY, *ar til' er i,* the name given to guns which are so large they must be mounted or fastened on platforms and cannot be carried and fired by hand. The term is also applied to the troops who operate such guns. Since the fourteenth century, when artillery was first introduced into warfare, every war has led to alterations in the type of guns and the tactics governing their employment. Napoleon was an emphatic believer in the power of big guns and whenever possible concentrated his artillery attack on a point of his enemy's lines which he intended to break. In the Franco-German War the French artillery was always outclassed in numbers and power, with the result that German victories were quickly secured. In the War of the Nations greater reliance than ever before in history was placed on artillery, and after the very early stages the conflict developed into contests between big guns.

Modern artillery can hardly be divided into *mobile* and *immobile,* as was the previous cus-

tom. Big guns are now brought into action and moved from place to place in such a manner as to prove that no artillery is immobile. What is regarded as strictly mobile artillery consists of *field* and *horse artillery* in batteries of four or six guns which can keep pace with marching troops and go into action with them. Field artillery, adjusting its march to the pace of infantry, is of heavier caliber than horse artillery, which must move with mounted men.

Field Artillery. All modern armies employ quick-firing breech-loading guns firing shells weighing from thirteen to eighteen and one-half pounds. These guns are capable of firing from ten to twenty aimed shots per minute and have a range varying from three and one-half to four and one-half miles. Effective range, at which perfect accuracy may be obtained, is usually considered to be between two and three miles, while at lower ranges such guns create terrific havoc. These guns fire common shells and shrapnel (see AMMUNITION). Ordinarily each gun in the field artillery is drawn by six horses, but in Europe, motor vehicles are used wherever possible and draw whole batteries of guns. The weight of the field gun varies in different armies. The German 3.03 caliber field gun with carriage weighs nearly a ton; the corresponding gun and carriage of the French army weigh 2,500 pounds, while the English 3.3 gun and carriage weigh 2,700 pounds.

Horse Artillery. The rapid motion of guns with mounted troops is naturally of the greatest importance when advancing or retreating. The artillery must manœuver rapidly to cover the troops and also, in case of need, to extricate themselves from difficulty. In the United States the guns are the same as those of the field artillery, and fire shells varying in weight from twelve to fifteen pounds. The cannoneers, however, are mounted, riding behind the gun carriages instead of on the carriages themselves; hence the name horse artillery.

Heavy Artillery. For siege purposes or for reducing forts and earthworks very large guns are used. The comparative ease with which large guns can be moved was one of the outstanding features the War of the Nations developed. Against the huge shells, weighing sometimes more than a ton, fired from guns with a caliber of seventeen inches, and a range of nearly twenty miles, the most scientifically constructed forts cannot stand. Masses of concrete and steel are quickly leveled to the ground, and gaping chasms are dug in earthworks and trenches by these terrible weapons. The *howitzer,* which proved so effective early in the War of the Nations, had been previously allowed to fall almost into disuse (see HOWITZER). It is now regarded as one of the most deadly of modern weapons. Howitzers of 5-inch and 6-inch caliber accompany troops on the march, while those of greater caliber are brought up more slowly and follow in the rear of armies. The 6-inch howitzer fires a shell weighing from 122 to 200 pounds and has a range of four miles. With its carriage it weighs 9,500 pounds. Until the introduction of the German 17-inch howitzer, the 9.4-inch howitzer was considered the largest size gun which combined ease of movement and general efficiency. However, each of the powers engaged in the war endeavored to outclass the others in size and range of its guns and projectiles. In 1918 the Germans shelled Paris with a mammoth gun of unknown dimensions from a distance of 76 miles. Its projectiles reached 15½ miles above the earth.

The "75." One of the most effective of all modern guns is that used by French artillery and known as the "75 millimeter" or "75." In inches, its caliber is 2.9, and it fires shell or shrapnel weighing twelve and fifteen pounds. In range, accuracy and speed of fire, and in destructiveness it has proved itself superior to any other weapon of a similar size.

The Mortar. This is the type of gun that so quickly reduced the forts of Liege, Antwerp and Przemysl. Although it was generally understood that 16-inch Krupp mortars worked the great destruction, the credit, or blame, lies with an Austrian 12-inch mortar, called a Skoda in honor of its inventor, which fires a shell weighing 858 pounds. This mortar fires at a greater angle of elevation than any other gun, and has a range of eight miles. At a distance of seven and one-half miles firing at an invisible object, German gunners pierced the roof of an Antwerp fort at the first attempt. The Skoda mortar is mobile and can be removed in forty minutes, while the dismounting and removal of the 16-inch mortar from its necessary bed of concrete is a work of hours. The 12-inch mortar is lowered to a horizontal position to be loaded and then swung to the angle of elevation desired. It can fire one shot per minute, though the usual speed is only one shot every two minutes. A crew of 200 men is needed, and it requires three 100 horse power motor trucks to transport it.

Anti-Air-Craft Guns. The War of the Nations brought into use a new type of gun, one for which there had previously been no demand. The danger from above, in the form of bombs, did not exist, or was not realized until actual accomplishments showed what an important part aeroplanes and dirigible balloons were to play in modern warfare. The ideal gun to resist aerial attacks, one firing a shell in an absolutely vertical line, has not yet been evolved, the nearest approach being a gun firing at an elevation of seventy-five degrees. Airships could not possibly rise above the range of big guns firing shells vertically. At such an altitude the occupants of the air craft would probably die for lack of air. Anti-aircraft guns are mounted on high buildings, on wheeled carriages or on automobiles, and are capable of rapid firing, rapid adjustment of sights and quick changing of the angle of elevation. Machine guns firing rifle bullets are effective against air craft when flying low, but heavier guns firing one-, two- and three-pound shells are more to be relied on.

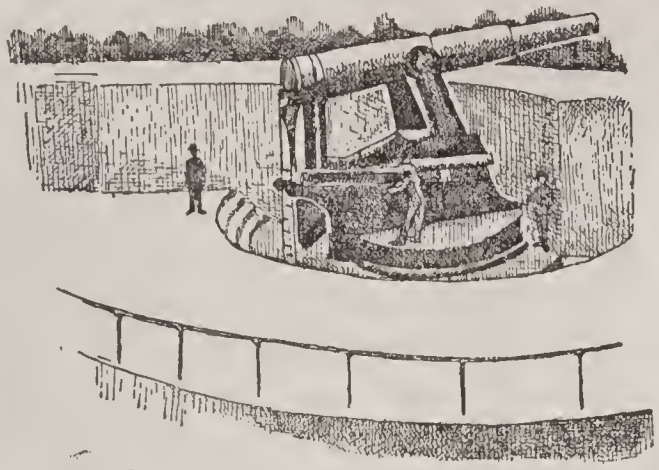
United States Artillery. In the time of the War of Secession the United States artillery consisted of muzzle-loading "cannon," as they were then called. Improvements, however, have kept pace with, and in some cases anticipated, those introduced into European countries. In the Spanish War the American artillery rendered good service, and at present the gunners of the United States navy and army are as efficient as those of any European power. The 3-inch field gun and mortar, 5-inch siege gun and 7-inch howitzer are the most modern and effective weapons. The forces of Canada are armed with guns similar to those used in the field and horse artillery of the regular British army.

How Big Guns are Made. The use of steel in the making of big guns is of comparatively recent origin and was rendered necessary by the constant struggle for supremacy between offensive projectiles and defensive armor. As it became necessary to use projectiles of greater power it became imperative to produce a weapon capable of discharging such projectiles with accuracy and with safety to those working the gun. Bessemer steel was one of the first and most important steps in the production of modern weapons of destruction (see STEEL). Other processes have followed by which the metal is still further hardened, enabling it, when forged or molded into the form of a big gun, to withstand the pressure of explosives that have steadily increased in power. A modern shell, fired from a gun made only a few years before the employment of hardened steel, would burst the gun and probably do more damage to those firing it than to the enemy. Modern weapons, however, are made to withstand a pressure of at least twenty tons to the square inch of surface, and bursting is of very rare occurrence. The steel now used is of the carbon type, or that with a certain proportion of nickel added. Steel with an admixture of four per cent of carbon and 0.4 per cent of nickel is now considered the strongest possible combination. Even this material undergoes further hardening processes, such as annealing and oil hardening, which will be later described.

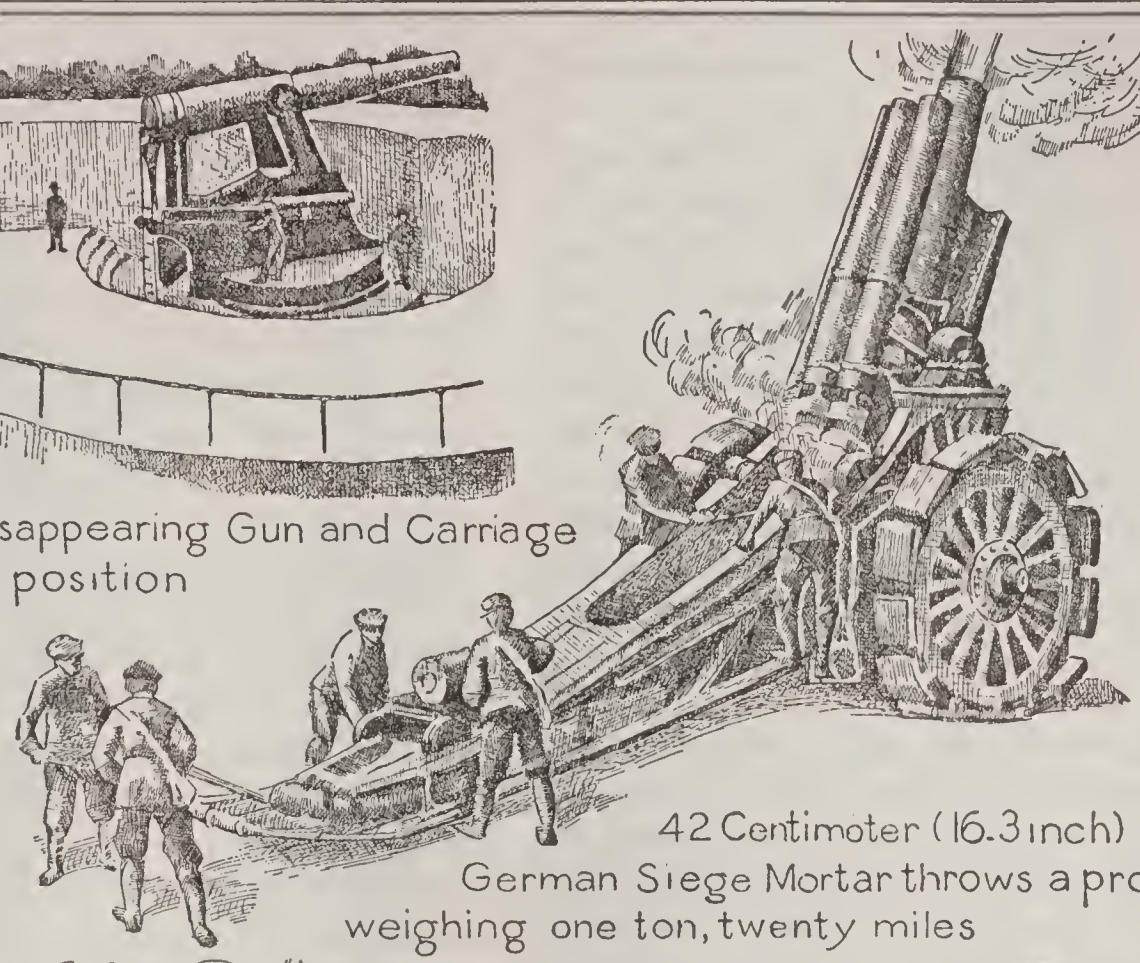
Forging. The first process is naturally to procure the molten steel. For this the open hearth method is employed (see STEEL). The molten metal is poured into a mold of the required size and allowed to cool. The ingot thus produced is reheated and transferred to a hydraulic press in which it is forged to the required shape and size. The steam hammer with its mighty blows has been superseded, the hydraulic producing greater pressure, amounting sometimes to as much as 10,000 tons. Guns of more than 8-inch internal diameter, or bore, are forged hollow over a tube cooled by running water. When the forging is complete the gun is heated again and allowed to cool gradually, usually being placed in warm sand; this process is termed annealing. A further hardening process consists of heating the metal to 1,600° F. and plunging it quickly into a bath of oil. The forged gun is placed on a lathe and the barrel is bored to the required size. The rifling, a series of curves or partial curves, is cut by machinery so delicately adjusted that the cutting may be judged to the thousandth part of an inch.

The Jacket. The above proceedings refer only to the inner barrel or tube of the gun. Next comes the process of fitting this tube with a jacket or covering to give it sufficient strength to meet its required test. An outer tube is forged of such a size that, when expanded by heat, it will fit over the inner tube. As it cools, the jacket contracts and grips the inner tube as tightly as though both were forged from one piece of metal. The completed gun is again placed in a lathe, when extra bands are shrunk on to strengthen it still further. The gun is then ready for its final testing for accuracy of bore, the breech mechanism is added, and the gun is ready to be mounted.

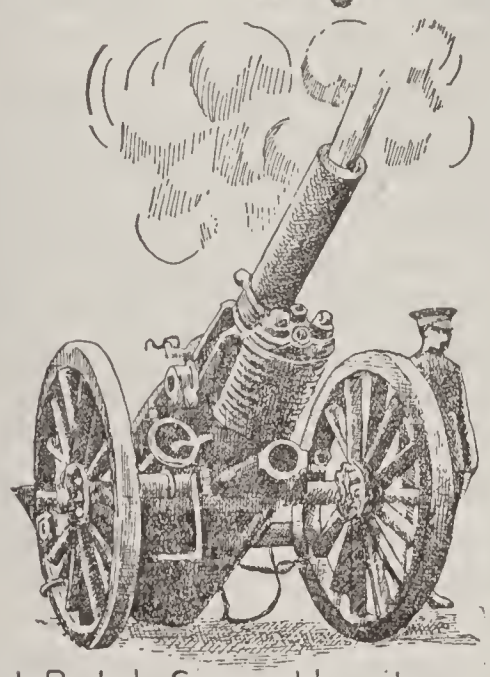
MODERN ARTILLERY



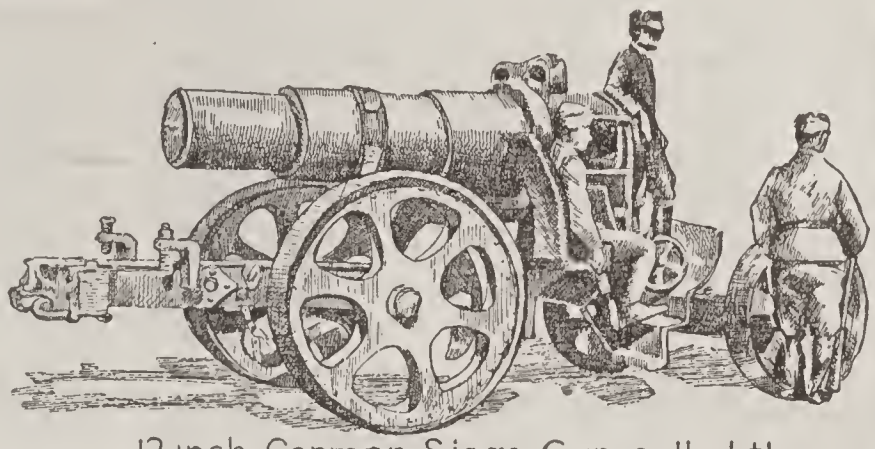
10-inch Disappearing Gun and Carriage
in firing position



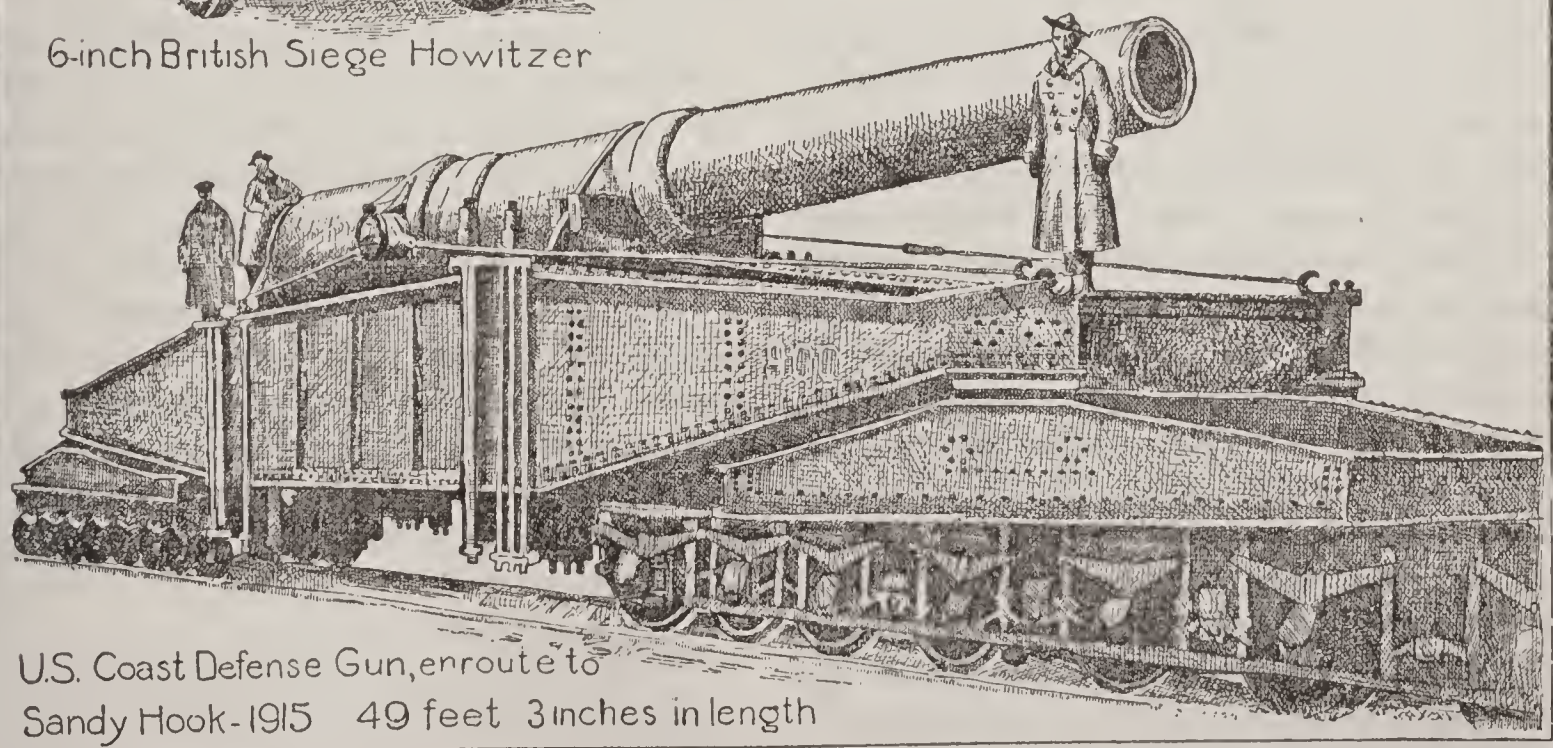
42 Centimoter (16.3 inch)
German Siege Mortar throws a projectile
weighing one ton, twenty miles



6-inch British Siege Howitzer



12 inch German Siege Gun, called the
"Jack Johnson" because of its "big smoke"



U.S. Coast Defense Gun, enroute to
Sandy Hook - 1915 49 feet 3 inches in length

The Breech. The breech of the cannon is a piece of mechanism which opens and closes the end of the gun in which the charge is inserted. When closed, the breech, or breech block, must have sufficient strength to withstand the shock of the bursting charge and yet be so easily and quickly opened and shut as not to interfere with the rapid working of the gun. The modern form of breech block is fitted with what is termed an interrupted screw, being divided into twelve sections. The breech is hinged, and when pushed forward into position, one-twelfth of a turn engages three-fourths of its surface in the threads grooved in the breech of the gun. One-twelfth of a turn disengages the breech block, which is swung open, bringing with it the exploded cartridge and, in some cases, at the same time raising another charge into position to be inserted in the breech. See PROJECTILE; AMMUNITION.

Coast and Fortress Artillery. Guns for permanent defense of coast or towns are mounted on carriages and platforms capable only of movements to bring the gun into position for firing over the defenses, or through embrasures, and for lowering so that loading may be done while completely under cover. Such guns are of large caliber and long range, so war vessels may not approach close enough to them to inflict damage before themselves being under fire. For other guns used in modern warfare see NAVY, subhead *Naval Guns;* HOWITZER; MACHINE GUN. L.R.G.

Any book on artillery written prior to the beginning of the War of the Nations (1914) will not describe the most modern weapons. Good books prior to that date are Bethel's *Modern Guns and Gunnery;* Spaulding's *Notes on Field Artillery.*

ARTS AND CRAFTS, a term comprising all the arts, except architecture itself, which go to "the making of the house beautiful." The phrase is now generally applied, however, to the revival of artistic, individual workmanship, as opposed to the labored, uniform designs turned out by factories. During the nineteenth century, especially in England, the growth of the factory system, with its specialized functions for each workman, seemed to have destroyed much of the artistic impulse or feeling among workmen. As early as 1840 or 1850 there was some public interest in wood-carving, metal work, spinning and weaving, pottery and other arts, but it was not until 1888 that the Arts and Crafts movement was recognized as a distinct break with the past.

The men who inspired and led this new movement in art—Carlyle, Ruskin, William Morris, Walter Crane—believed that all work should produce a useful, artistic result. Art for them was not confined to oil paintings in gilt frames but included all the countless products of human hands. "Real art," said Morris, "is the expression by man of his pleasure in labor." Ruskin expressed the same idea when he said that there are three tests of work; it must be honest, useful and cheerful. To rescue public taste from the cheap imitations of foreign models, to encourage sound workmanship, and raise the handicrafts to their rightful position as arts, these were the aims of the leaders.

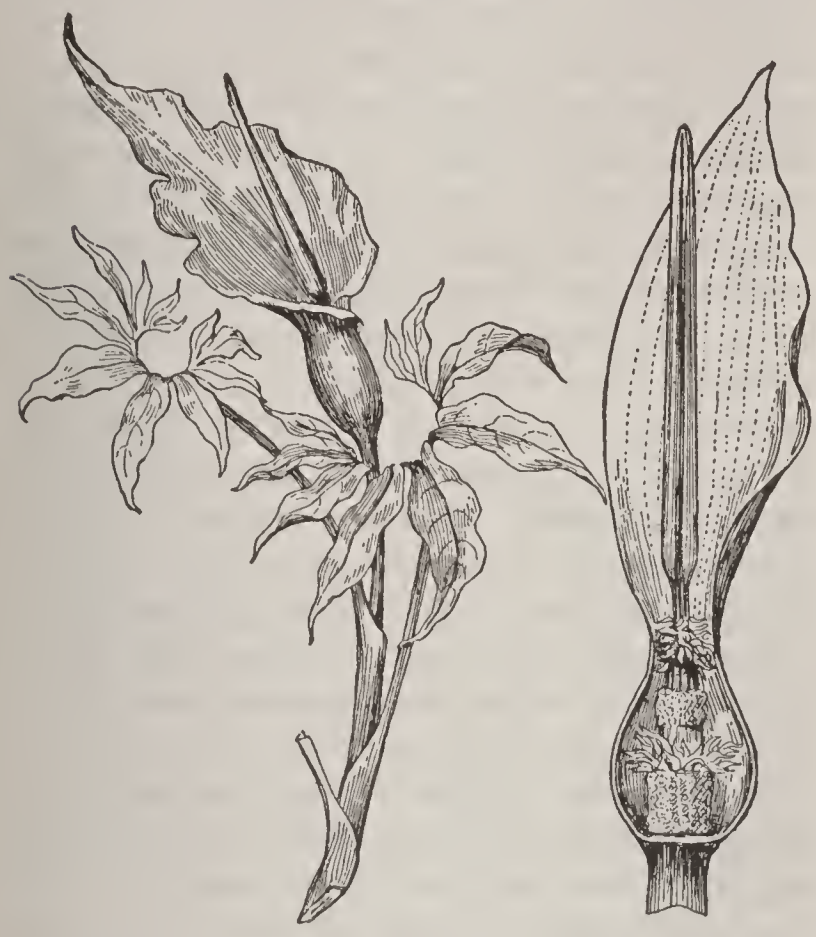
The success of the movement was due chiefly to the artistic and practical skill of William Morris, who in turn mastered the details of every craft in which he became interested; "he was painter, designer, scribe, illuminator, wood-engraver, dyer, weaver, and finally printer and paper-maker." The work of William De Morgan in pottery, and of T. J. Cobden-Sanderson and his pupils in bookbinding, is also noteworthy. Thousands of workmen, influenced by the example of such leaders, now realize the dignity of work and its artistic possibilities, and nearly every community has its enthusiastic arts and crafts devotees.

The arts and crafts movement was not confined to England, but spread to other European countries and to America, where one of its leaders was Elbert Hubbard, founder of the Roycrofters. A notable feature of the movement was the popularity of the "mission" style of furniture, an imitation of the simple, handmade articles of the early Spanish missions in the west.

"Have nothing in your houses which you do not know to be useful or believe to be beautiful" was Morris's ideal. He would prefer a single beautiful picture, even though cheap, to a dozen ugly or indifferent prints. The fitness of an object for its purpose, the sincerity and honesty of its workmanship, not the price or fashion, were new tests of art. A workman should express his personality in the products of his hands, and he should regard the material and purpose of an object as the controlling factors in artistic expression. See MORRIS, WILLIAM. W.F.Z.

Consult Crane's *An Artists' Reminiscences;* Mackail's *Life of William Morris;* Triggs' *Chapters in the History of the Arts and Crafts Movement.*

ARUM, *ay' rum,* the name given to a number of plants which greatly resemble the Jack-in-the-pulpit, to which they are related. The showy lily-like part which is usually called the flower is not really a flower at all, but is known as the *spathe,* while the flowers are tiny inconspicuous things massed about the central spike. Many varieties are cultivated in hot-houses on account of their beauty. The stems and leaves contain a bitter juice, and the bulbs from which the plants spring contain a starch which may be used for food. See CALLA; JACK-IN-THE-PULPIT.



ARUM
Leaves, flower and cross-section of latter.

ARYAN, *ahr' yan,* meaning *lord of the soil,* is the name given to that branch of the human race whose members are supposed to have lived originally in Central Asia, east of the Caspian Sea and north of the Hindu Kush Mountains. They are also called the Indo-European and Indo-Germanic race. With the exception of the Turks, the Magyars of Hungary, the Basques of the Pyrenees and the Finns of Lapland, all the nations of Europe sprang from this branch of the human family. Centuries ago the Ayrans became the ruling race of India and their ancient language was Sanskrit. All modern languages sprang from these people. See LANGUAGES OF THE WORLD.

ASAFETIDA, *as a fet' i da,* also spelled ASAFOETIDA, is a gumlike drug having a powerful, disagreeable odor much stronger than that of garlic. It is employed in medicine to prevent spasms and to calm mild attacks of hysteria. In the latter case, some one says, the patient finds the medicine so extremely distasteful that he controls himself and thus a second dose is unnecessary.

ASAFETIDA
The plant, flower and fruit.

Asafetida is obtained by drying the milky juice from the roots of a large plant of the parsnip family that grows in Asia. It is found on the market most commonly in the form of small, brownish lumps. In spite of its disgusting odor, asafetida is used in South America, India, Persia and France as a seasoning. Years ago people used to hang a little bag containing asafetida about the neck as a protecton against scarlet fever, but that is one of the beliefs closely allied to superstition that now prevails only in very ignorant minds.

ASBESTOS, *as bes' tos,* a substance properly classified as a mineral, although it possesses qualities peculiar both to the mineral and vegetable kingdoms. It is, in fact, a species of the hornblende family of minerals, composed of perfectly smooth, separable fibers, sometimes delicate, flexible and elastic, sometimes stiff and brittle. It is heavy in its crude state, but the fibers can be made as light as down after they are treated for commercial uses. Separating the asbestos fiber from the mineral gives a snowy mass of what might be termed mineral wool. Three or four processes of carding bring this material into shape to be woven into cloth, packing or whatever form may be desired. The commercial value of asbestos depends upon its quality of indestructibility. It successfully withstands the attacks of fire, acids and time. By ancient peoples it was made into a cloth for shrouds for bodies burned on funeral pyres. Asbestos is found in many parts of the world; several states of the American Union produce it in limited quantities, notably California, Wyoming and Montana, but the principal supply comes from Quebec. The Canadian production has reached 136,000 tons yearly, worth nearly $4,000,000.

It is the fact that asbestos will not burn which makes it of so much value. Its uses are many and varied. Absolutely pure asbestos-

cloth curtains form one of the safest barriers against fire in theaters. After the disastrous Iroquois theater fire in Chicago in 1903, many cities passed laws requiring theaters to be equipped with such curtains. Asbestos is used extensively as a covering for steam-pipes, to provide against loss of heat, and asbestos cement is used for hot-blast pipes and fire-heated surfaces. Compressed asbestos fiber board may be used for flooring and woodwork in general, and when so used may be stained, polished and finished the same as wood. Asbestos is quite frequently used for upholstering and for carpets; a peculiarity of the latter is that the longer such a carpet is used the tougher it becomes, although it does not improve in appearance. Asbestos is also ground fine and used in paints. Roofs are made by treating strong canvas with a combination of asbestos and felt. Mittens for iron and glass workers are made from asbestos yarn. Asbestos soldering blocks are used by goldsmiths. In combination with rubber, it is much used as an electrical insulator. Asbestos cloth is used for acid filters in all sorts of chemical processes, for the reason that no acid will eat it.

Consult *The Production of Asbestos,* issued by the United States Geological Survey; Circle's *Chrysotile—Asbestos, Occurrence, Exploitation, Milling and Uses,* published by Canadian Department of Mines.

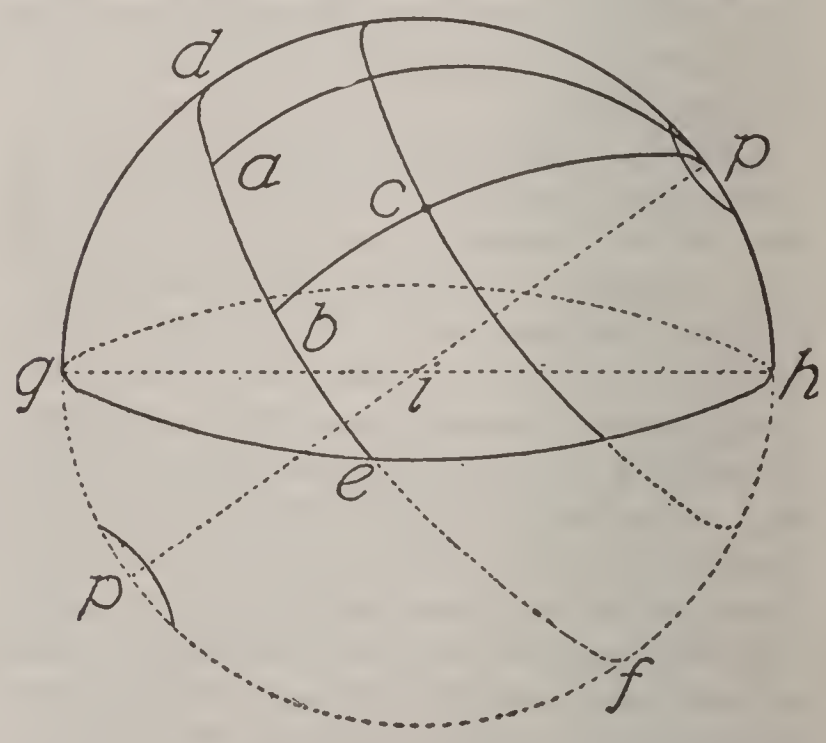
ASBJÖRNSEN *as byurn' sen,* PETER CHRISTEN (1812-1885), a distinguished Norwegian naturalist and writer of fairy tales, who wandered on foot from one end of Norway to the other collecting the legends and folk tales of the peasants. He worked with his friend Jörgen Moe, and many of the tales which they published they wrote together. Asbjörnsen was an eager student of zoölogy and forestry, but his work as a collector and writer of fairy stories overshadows what he accomplished as a scientist.

ASBURY, *az' ber y,* FRANCIS (1745-1816), famous as the "Father of American Methodism" and as the first bishop of the Methodist Episcopal Church to be ordained in the United States. He was born near Birmingham, England, was converted to Methodism at the age of thirteen, and in 1771 went to America as a missionary. Through his efforts the membership of the Church rapidly increased, and in 1784 John Wesley appointed him bishop. This appointment was a little later ratified at Baltimore by a conference which marked the real beginning of the Methodist Episcopal Church in America. To the end of his life Asbury worked with untiring zeal for the Church, and during his ministry preached over 16,000 sermons.

ASBURY PARK, N. J., in Monmouth County, sixty miles south of New York City and eighty miles northeast of Philadelphia, is one of the most popular summer resorts on the Atlantic coast. Wesley Lake, on the north, separates Asbury Park and Ocean Grove. The city is served by the Pennsylvania and the Central of New Jersey railroads and by electric interurban lines. In 1910 the population was 10,150; in 1920 it was 12,400.

The city owns a fine two-mile beach bordered for a part of its length by a board walk and bath houses. It has a Federal building, public library, municipal hospital, splendid hotels, theaters, lecture halls and pavilions, several small parks, an aviation field and a national rifle range. There are attractive drives in all directions. The summer population frequently exceeds 100,000, and the season's festivities include a baby parade, lake carnival, masque fête and fireworks displays. The manufacturing of sleeping garments gives employment to 300 people.

Asbury Park, named in honor of Bishop Asbury (which see), was founded in 1869, incorporated in 1874 and became a city in 1897. In 1914 the commission form of government was adopted. The water system and beach are owned by the municipality. C.E.W.B.



(*a*) Vernal equinox; (*b*) point on equator at which circle through that from pole crosses; (*c*) position of star; (*d, e, f*) celestial equator; (*g, h*) horizon of person standing at (*i*).

ASCENSION AND DECLINATION OF STARS. As the position of places on the earth is described by the terms *latitude* and

longitude, so is the position of heavenly bodies defined by the terms *right ascension* and *declination.* It must be remembered, however, that the position of heavenly bodies is stated with reference to the *celestial equator.* On earth Greenwich is the starting point of measurement of longitude. In the heavens it is the "first of Aries," or the vernal equinox. Thus the right ascension of a star is ascertained by drawing an imaginary line from the celestial pole through that star to the celestial equator. The measurement of the arc of the equator from the point on the equator where the line crosses to the first of Aries, or vernal equinox, is the right ascension of the star. The *declination* is the distance north or south of the celestial equator measured on the arc of the imaginary line from the star to the equator.

ASCENSION DAY, a holy day of the Episcopal and Roman Catholic churches, set apart to commemorate the ascension of Christ, and ranking with Christmas, Easter and Pentecost. It falls on the fortieth day after Easter, or ten days before Whitsunday, when the day of Pentecost is observed, and always occurs on Thursday. It is often called *Holy Thursday.*

ASCETICISM, *as set' esizm,* the practice of self-denial and bodily suffering for the purpose of gaining spiritual strength. The term commonly refers to the acts of some of the early Christians, whose fastings and self-inflicted tortures were often prolonged and severe. But asceticism has been preached and practiced from times far earlier. The word itself was first applied to the training undergone by Greek athletes preparing for a contest. Fasting was frequent among Old Testament peoples, and self-denial must have some connection with sacrificing to deities, a custom of all primitive races. The monks of the Middle Ages were ascetics, and to a certain extent, the Puritans. They first gave up all the attractions of the world—money, power and family life. The Puritans denied themselves luxuries in dress or amusement and made life a business of seriousness, but did not withdraw from the world and its normal activities.

ASGARD, *as' gahrd,* to the ancient Scandinavians, was the home of the gods, as Olympus was to the Greeks. Here each god had his palace, and here was the radiant hall in which their councils were held, presided over by Odin (which see). But the Scandinavians believed that sooner or later evil would triumph over the great gods, and that all the bright dwellings of Asgard would be destroyed.

ASH, a tree of the olive family that sheds its leaves in winter. There are over fifty different kinds, found chiefly in Europe and North America. The flowers are small and appear before the leaves; the fruit is a winged

THE ASH TREE
The form of the tree, also shape of leaves and appearance of fruit.

seed vessel with one seed. The leaves are light green; they appear late and fall early.

The ash is a beautiful shade tree, and is a favorite in parks. The *white ash* is one of the most useful of trees. Its wood is hard and tough, and is valuable in the construction of carriage wheels and for turning; it is also excellent fuel. The *black ash* is found in low, wet land and can be recognized by its almost black bark. Its wood is easily split into thin pieces and is extensively used in the manufacture of hoops, staves and baskets. The *blue ash* is so called because its bark turns water blue. Several trees popularly called ash do not belong to the ash botanically. See MOUNTAIN ASH; PRICKLY ASH.

ASH, or **ASHES,** the substance that remains after any material has been burned. The term is usually applied to the mineral obtained on burning wood, coal, plants and the like. The following substances are obtained from burning: lime, soda, potash, sulphur, phosphorus, zinc, copper, iron and sand. It is a well-known fact that plants absorb these minerals from the soil, and continuous cultivation of the soil leaves it poor in mineral substance. It becomes necessary, therefore, for these substances to be returned to the soil in the form of fertilizers, if its productivity is to be maintained.

From the ashes of sea-weed great quantities of iodine are secured, while wood ashes has been a source of potash from the earliest times. See ALKALI; FERTILIZER.

ASHANTI, *a shan' tee,* a British colony in West Africa, inland from the Gold Coast, inhabited chiefly by warlike negroes. It has an area of 23,000 square miles and a population of about 420,000. On the west, it is bounded by the French Ivory Coast territory, and it is surrounded on all other sides by British West African possessions. The chief town is Kumassi, with about 19,000 inhabitants.

At one time, Ashanti was the greatest slave market in the world, slave traders from all parts of Africa meeting at Kumassi to dispose of their captives. Abolition of this traffic by the British authorities has led to the introduction of peaceful pursuits. Cocoa and rubber are extensively grown, and gold to the value of about $1,275,000 is yearly exported. A railway runs from the coast to Kumassi, opening up important mining and agricultural districts. Gold, silver and copper money is in use, but the natives in many parts adhere to the use of cowries and other shells for currency (see COWRIE).

Although nominally under British protection since 1874, the country was not formally annexed until 1901, after repeated rebellions and serious wars. Ashanti is administered by a British resident commissioner, who is responsible to the governor-general of the Gold Coast.

ASHBURTON, *ash' bur t'n,* ALEXANDER BARING, Lord (1774-1848), a prominent English financier and diplomat, best known as one of the negotiators of the Webster-Ashburton Treaty (which see), between Great Britain and the United States. The interests of the latter country were in the hands of Daniel Webster. For many years before the death of his father he was in the firm of Baring Brothers, and on his father's death he became its head. While on a trip to the United States he met and married Anne Bingham, the daughter of a United States Senator from Pennsylvania; and when, in 1842, the disagreement between the United States and Great Britain in regard to the northeast and northwest boundary lines had reached a crisis, Ashburton, by reason of his American connections and his familiarity with American ideas, was appointed to attempt the readjustment of the difficulty.

ASHEVILLE, *ash' vil,* N. C., a famous summer and winter health resort and an educational and manufacturing city. It is the county seat of Buncombe County, in the western part of the state, and is beautifully situated in the Blue Ridge Mountains, near the confluence of the French Broad and the Swannanoa rivers. The elevation is 2,350 feet, and many of the wooded hills near by rise above 6,000 feet. The surrounding country, largely agricultural, is also noted for its fine timber. The mean temperature is 55°. The population was 18,762 in 1910; in 1920 it was 28,504. Of this number ninety-eight per cent are American, of whom about twenty-five to thirty per cent are negroes. These figures are exclusive of the 200,000 annual visitors. The area is six square miles.

Asheville is on the Southern Railway. Raleigh, the state capital, is 210 miles east; northwest 129 miles is Knoxville, Tenn., and Atlanta, Ga., is 262 miles southwest. The important manufacturing industries of the city include furniture and ready-cut houses, caskets, leather goods, cotton goods, farm implements, and mica. The combined payroll of these industries amounts to nearly $2,500,000 annually.

In the city and surrounding country are a number of beautiful parks and places of scenic interest, including Round Knob, Richmond Hill, Overlook Park, Beaumont, Connally's View, Riverside Park and Lake, and Swannanoa Drive. Fine automobile roads lead to all of these places. About two miles southeast of the city is Biltmore, the country place of George W. Vanderbilt. It is probably the most magnificent private estate in America, the grounds cover 132,000 acres, including Pisgah Forest, a hunting reserve, and rare botanical gardens. Pisgah Forest was purchased by the National Forest Reservation Commission in 1914. The splendid chateau on the estate is French Renaissance in design. The all-turf golf course of the Asheville Country Club is one of the finest in the South.

A number of elegantly-appointed hotels, including one said to be the finest tourist hotel in America; the Park Memorial Public Library; the government building; a large auditorium, and sanitariums are among the notable public buildings. Asheville has a number of educational institutions, in addition to the public school system. There are the Normal and Collegiate Institute, the Home Industrial School, both under the auspices of the Board of Home Missions of the Presbyterian Church, St. Genevieve's College, Asheville School for Boys and Asheville School for Girls.

The settlement of Asheville was begun in 1792 and received its name in honor of Governor Samuel Ashe. It was chartered as a town in 1797 and obtained a city charter in 1883, which was revised in 1901. N.B.

ASHLAND, Ky., a manufacturing city in Boyd County, in the northeastern part of the state, 140 miles east and north of Frankfort, four miles south of Ironton, Ohio, and fifteen miles northwest of Huntington, W. Va. It is on the Ohio River near the mouth of the Big Sandy, and on the Chesapeake & Ohio and the Norfolk & Western railroads. The town has connection by an electric interurban line with Huntington. The area exceeds two square miles. In 1910 the population was 8,688; in 1920 it was 14,729.

Ashland was settled in 1854 and became a city in 1870. It has a Federal building, erected at a cost of $100,000; a public library, two hospitals and attractive church and school buildings. Central Park is a natural park in the center of the town, and just east is Clyffside Park, a reserve of seventy-five acres maintained by a private corporation, where the Tri-State Chautauqua is held.

Ashland is in a rich mineral oil and lumber region and has an important river commerce in manufactured articles and iron ore. The important industries of the city include manufactories of pig iron, coke, cut and wire nails, wire rods, steel billets, sheet steel, fire brick, leather, cement, furniture stock and oak and poplar lumber. H.R.D.

ASHLAND, Wis., a shipping point of importance and the county seat of Ashland County. It is situated on Chequamegon Bay, on the northern coast of the state, sixty miles east of Duluth, 180 miles northeast of Saint Paul and 250 miles northwest of Milwaukee. Besides being a lake port it is the terminus of four railway lines—the Chicago & North Western; Chicago, Saint Paul, Minneapolis & Omaha; Minneapolis, Saint Paul & Sault Sainte Marie and Northern Pacific. In 1910 the population was 11,594; in 1920 it was 11,334. The area comprises eleven and one-half square miles.

Ashland has one of the best harbors on Lake Superior, and the immense ore-docks here were built to accommodate the large shipments of hematite ore from the Gogebic Iron Range. The city has large interests in lumber and brown stone and extensive dairying and fruit-growing industries. Besides these, there are lumber mills, pulp mills, large steel works, charcoal blast furnaces for the manufacture of pig iron, and the machine shops of the Chicago & North Western Railway. For advanced study there are Northern College, Sacred Heart Convent and North Wisconsin Academy. The city has the Vaughn Public Library. The United States government building and post office and the Rhinehart and the Sisters' hospitals are worthy of note. Apostle Islands, a group of twenty-seven islands in Chequamegon Bay, are of scenic and historical interest.

The first settlement was made in 1854; it was incorporated in 1863, was chartered as a city in 1887 and since 1913 has been under the commission form of government. The growth of the city began with the development of the Gogebic mines in 1885.

ASHTABU'LA, Ohio, an important shipping point, especially for coal and iron. It is situated in Ashtabula County, in the northeast, on Lake Erie, at the point where the Ashtabula River discharges into it. Cleveland is fifty-four miles southwest, and Buffalo is 129 miles northeast. Through the service of the New York Central Lines, the Pennsylvania and the New York, Chicago & Saint Louis railroads and the excellent harbor, Ashtabula has become a leading transfer shipping point. Electric lines extend from Ashtabula to cities east, south and west. Finns, Swedes and Italians comprise thirty per cent of the population, which increased from 18,266 in 1910 to 22,082 in 1920. The area is five and one-half square miles.

Ashtabula is the center of a large agricultural and dairying region; it is famous in its territory for its large greenhouses, where vegetables are raised under glass in winter in sufficient quantities to supply the larger cities. More iron ore is received here annually than at any other port in the United States (probably in the world), and is reshipped to Pittsburgh, Youngstown and other manufacturing cities. The course of the river has been improved by the city, thereby increasing the facilities for commerce and manufacture. Ashtabula has a large dry dock, an extensive ship-building plant, car-repair shops, tanneries and manufactories of farm implements and garden tools. It has a Federal building and a Carnegie Library. The park reservations cover 200 acres and extend along the lake shore and river bank.

The first settlement was made in 1804. The town, which included Kingsville, Sheffield and Plymouth, was organized in 1808; later, these three villages were incorporated separately. Ashtabula became a city in 1892, and in 1916 the commission form of government was adopted. A railroad accident on the bridge over the river in 1876, yet remembered throughout the country as the "Ashtabula dis-

aster," resulted in the loss of more than 100 lives. T.H.

ASH WEDNESDAY, the first day of Lent. It derived its name from a practice which was common in the Church in medieval times and still survives in somewhat altered form. It was customary to preserve the ashes obtained by burning the palms after Palm Sunday (which see). The ashes were sprinkled by the priest on the heads of those who came as penitents on that day. In the Roman Catholic Church to-day the priest blesses the ashes near the altar and puts them on the foreheads of the clergy and congregation. As he touches each forehead he intones in Latin: "Remember, man, that thou art dust, and into dust thou shalt return."

The Protestant Church in Germany does not observe the day; and while it is celebrated in the Church of England and the Protestant Episcopal Church in America, the ceremony which gave the day its name has been greatly changed and simplified during the past hundred years. See LENT.

ASIA, the vastest land mass on the globe, comprising more than one-third of the entire land surface. What the name means is not known, but it is held by some authorities to be derived from an Assyrian word meaning *the rising sun,* and thus to signify the East, just as the word *Europe* is believed to denote the *West,* or *the setting sun.* The area of Asia, 17,250,000 square miles, is one and a half times as great as that of Africa, the second largest grand division, five times that of Europe exclusive of its islands, and greater than that of North America and South America combined. Its estimated population of 918,000,000 is more than half that of the whole world, yet there are within it vast stretches that are uninhabited, and other tracts where the population is but five to the square mile. To offset this, there are other parts of the continent where people are crowded together as they are nowhere else in the world.

Political Divisions. A large part of Asia is under the control of European governments, but there are a number of independent countries. These are (1) the Chinese republic, which includes China proper, with yet some claim to Manchuria, Mongolia, East or Chinese Turkestan and Tibet; this division has an area of about 4,278,000 square miles; (2) Japan, with an area of 174,700 square miles; (3) Siam, with an area of 230,000 square miles; (4) Persia, 635,000 square miles; (5) Oman, in Arabia, 82,000 square miles; Nepal and a number of small states in Arabia and in the Himalayas.

The semi-independent countries are Afghanistan (250,000 square miles) and Baluchistan (134,650 square miles), under the domination of Great Britain. Korea was independent until 1910, when it became a Japanese province with the name Chosen. The interests of European nations in Asia are as follows:

France. Pondicherry and four minor possessions in India; Indo-China, including Annam, Cambodia, Cochin-China and Laos; and Kwang Chau Wan, leased from China. Total area, 256,000 square miles, of which less than 400 are outside of Indo-China; total population, 17,500,000.

Germany. Kiauchau, leased from China, taken by the Japanese in 1914. Area, about 200 square miles, population about 192,000.

Great Britain. Aden colony and protectorate; Bahrein Islands (in the Persian Gulf); Ceylon; Cyprus; Hong Kong and adjoining leased territory; India; Straits Settlements; Federated Malay States protectorate; and Weihaiwei, leased from China. Total area, about 1,875,000 square miles, of which 1,802,629 are in India; total population, about 322,000,000, of which over 315,000,000 are in India.

Portugal. Macao, in China; Goa and two minor possessions, in India. Total area, 1,642 square miles; total population, about 600,000.

Russia. Siberia; Trans-Caucasia; Steppes; Turkestan; Trans-Caspia; and the vassal states of Bokhara and Khiva. Total area about 6,400,000 square miles; total population, about 30,000,000.

Turkey. Asia Minor; Armenia and Kurdistan; Mesopotamia; Syria; and part of Arabia.

Total area, 700,000 square miles; total population, 20,000,000.

The leading countries, rivers and mountains named above are described under their proper titles in these volumes, and for detailed accounts the reader is referred to those articles.

The Coast. Three oceans, the Arctic on the north, the Pacific on the east, and the Indian on the south, bound this great continent on three sides, and on the west the boundary is formed by the Mediterranean, Caspian, Black and Red seas, with Europe, which is really but a peninsula of the Asian land mass, stretching away to the westward. Only the narrow Bering Strait separates Asia from North America on the northeast. All of the coasts have deep indentations, but those on the north are but estuaries at the mouths of rivers, while on the east and south there are great seas—to the east, Bering Sea, the Sea of Okhotsk, Sea of Japan, Yellow Sea and South China Sea, and to the south the Bay of Bengal and the Arabian Sea, with its extension, the Persian Gulf. The coast line of Asia is almost 35,000 miles, little less than twice that of Africa. Along the eastern coast, stretching off to the southeast, lie numerous islands and chains of islands, some of which are of the utmost importance—the islands of Japan, the Philippines, Borneo, Sumatra, Java, New Guinea and the thousands of small islands which help to make up the Malay Archipelago.

A Land of Extremes. Asia is the land of the most extensive plains, the greatest plateaus and the highest mountains in the world. Its highest peak, Mount Everest in the Himalayas, 29,002 feet, is more than twice as high as Pike's Peak, while its deepest depression, the Dead Sea in Palestine, is 1,290 feet below sea level. On the steppes of Western Siberia a temperature of 90° F. below zero is by no means uncommon, and the average winter temperature is far lower than that in the polar regions; but in parts of Arabia the heat is extreme, and Aden, cut off by sheltering cliffs from breezes, is the hottest spot in the world. Sharp as are these contrasts, there is nothing remarkable about them when the vast extent of Asia is considered.

How the Continent Is Divided. In Asia the great mountain systems make barriers which have proved far more effective in keeping people from crossing from one part of the continent to another than have the Rocky Mountains in North America, for instance; for dwellers in North America have been determined to possess all the land, and have consequently pushed on over the mountains. Climate and living conditions may differ with the varying locations, but the same civilization exists on both sides of the great American Continental Divide. The Asiatic peoples, however, for the greater part have not been progressive enough to attempt to overcome such obstacles. Each nation or group of nations lives within its own boundaries, holding to its own manners and customs, differing decidedly from the other nations just over the mountains. Invasions there have been at all times in the history of Asia; India, for example, was for centuries the prey to any conquering hordes that might sweep over the mountains; but these invaders either came and withdrew, leaving no trace, or settled in the new land and were absorbed by its people. They never established any relations between the two sides of the great barrier.

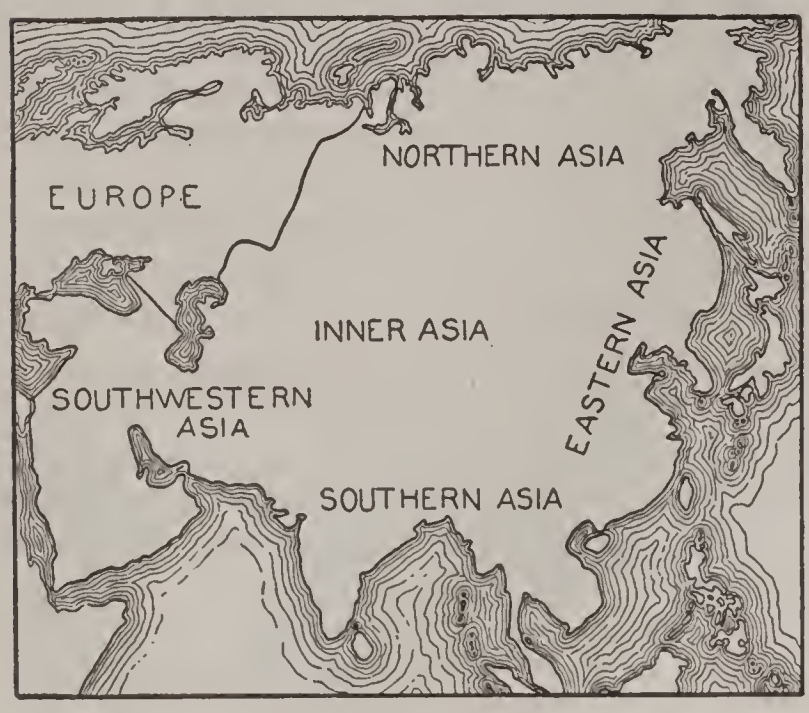
The mountains of Asia are not a well-marked chain like that which runs through Western America, but no other mountain systems can vie with them in height and in grandeur. The center of the system, if anything so definite as a center can be claimed for these irregular chains, is the Pamir plateau to the north of India—the "roof of the world," as dwellers in that region love to call it. This is not just a great flat tableland, but a series of mountains and valleys so elevated that the bottom of the deepest valleys is about 11,000 feet above sea level. And over all these, lofty peaks tower to a height of more than 25,000 feet, as high above the valley floors as Pike's Peak is above sea level.

Branching from the Pamirs mountain ranges extend in various directions. To the northeast is Tian-Shan range, then the Altai Mountains, and beyond these the Yablonoi and the Stanovoi mountains, ranges of lesser height, continue the system to the shores of the Pacific. Southeast from the Pamirs are the Karakorum Mountains and, loftiest and most impressive of all, the Himalayas, in which is included Mount Everest; while to the west of the "roof of the world" branches off a great system which comprises the Hindu Kush, the Elburz, and the Caucasus; the latter forms part of the physical boundary between Europe and Asia.

Lesser ranges rise in various parts of the continent—ranges which would stand out as vast and impressive in a land of less lofty plateaus; but the mountains described above are those which separate Asia into regions so

distinct that passage from one to another is difficult.

So definite and isolated are these divisions that it is easier to treat of their geography,



PHYSICAL DIVISIONS

This map makes it easy to understand the description of the land surface of the vast continent.

their population and their history separately than to consider the continent as a whole. These divisions, roughly speaking, may be called (1) Northern Asia; (2) Inner Asia; (3) Eastern Asia; (4) Southern Asia; (5) Southwestern Asia.

Northern Asia. This is the vastest of these regions, with 6,660,000 square miles—an area almost as great as that of Canada and the United States combined.

The Land. Northern Asia has great rivers, the Ob, the Yenisei and the Lena, which in size rank not far below those of North America; and wide-stretching plains with which the Mississippi Valley cannot compare in extent. But the difference between Canada and the United States and this Asiatic region, consisting of Siberia, Russian Turkestan and Transcaspia, is incalculable. It is not simply a question of development. Northern Asia will never, in all probability, merit or repay even a small part of the energy which has made the United States and Canada what they are. In the southern part of the region, in Transcaspia and Russian Turkestan, lack of rainfall results in extensive regions that are absolutely desert in character, supporting only half-savage nomad tribes or an occasional group which makes its home on an oasis. See Nomad Life.

To the northward, as the rains become more abundant, occurs a grassy region where horses and cattle find good pasturage, and still farther north there is sufficient moisture for the raising of temperate-region crops, especially the grains. Through this region has been built the Trans-Siberian Railroad (which see), for this section alone seems now capable of high development. Unbroken forests stretch from the northern limit of this region, reaching almost to the tundras of the Arctic region. The lower parts of the rivers remain frozen long after the ice has disappeared in the upper courses. As a result, almost the whole northern coast region is a flooded morass unhabitable and impenetrable. This region, in which nothing but a coarse moss grows, is the tundra belt. The whole land presents an unspeakably dreary and inhospitable appearance.

Its Inhabitants. Even the stolid Asiatics, who are accustomed to misery and to scanty food, find most of Northern Asia too desolate and too unproductive to afford them a dwelling place, and the region as a whole is sparsely populated. In the most northerly inhabited belt are tribes belonging to the Mongol or yellow race. Of these the Samoyads are best known. They resemble the Lapps of Northern Russia, and also the Eskimos of the American continent. Russia, to which much of the region belongs, has sent out many colonists, but these have almost without exception settled in the grain-growing country (see Siberia). The few exceptions are the hunters and trappers who gain their livelihood by selling the pelts of the fur-bearing animals with which the great forests abound. Neither the Russian immigrants, the wandering tribes of Turkish stock, nor the Mongols to the east have ever made any attempt to develop the mineral resources of the region, and it cannot be told whether these are great or small.

Centuries ago, before Russia itself was well established, adventurers made their way from that new empire into the vast plains to the east, for the connection between the two continents is here very close. The scattered inhabitants offered no resistance, nor did any of the other European powers oppose, and from the sixteenth century Russia continued to assert its right to the territory more and more firmly.

Inner Asia. This region, with an area of two and one-half million square miles, includes Tibet, Mongolia and Chinese, or East, Turkestan. Nearly all of this region is arid; much of it is a desert having intensely cold winters, very hot summers and terrific sandstorms. About all the rain that falls comes in the form of cloudbursts. Theoretically, China is

supreme over all this territory, but practically, the Chinese hold on it amounts to almost nothing. Russia is far more influential in all parts of the region except Tibet, where England is the dominant nation. Save as barrier states between north and south, these provinces are of no great value to any country, for they have not even the possibilities of the plains of Northern Asia. Sloping down from the towering Himalayas, the plateau of Tibet is far too high and too cold to permit much agriculture, and the lower regions are so shut in by mountains that they never receive any rain. Minerals there are in abundance, especially gold, but the people are too unprogressive ever to have made much effort to secure it. The population is even more sparse than in Northern Asia, for no country has sent into Inner Asia the thousands of colonists that Russia has given to that northern region, and in all the 2,500,000 square miles there are but 4,500,000 inhabitants. Many of these depend for their support not on the products of the soil, as do the people of more favored regions, but upon certain animals. In the lowlands of Turkestan the Bactrian camel is the chief wealth of the region, and above, in high Tibet, the yak is what the reindeer is to the tribes of the Siberian plain—almost their sole support. See CAMEL; REINDEER; YAK.

Eastern Asia. Far more important than either of the regions discussed above is this third division, which includes China proper, Japan, Korea (or Chosen), Manchuria, Indo-China and Siam. Quite unlike the other two, it has over large sections a very dense population—few places in the world are more thickly settled. Its area is 2,600,000 square miles, its population about 450,000,000. Thus with an area little more than two-thirds that of Canada, it has a population more than sixty times as great.

The Land and Its Resources. This density of population proclaims one great economic fact—practically all the land must be utilized. And so indeed it is. There are no great forests given over to wild animals; no vast plains where cattle graze; no deserts where nothing but a camel can live. From the northern part of China, with its cold winters and its hot summers, to Siam with its tropical climate, there is everywhere enough rain for agriculture. For all the moisture which the great sea winds bring is forced out before these winds cross the mountains to the interior, and while that fact means desert conditions for Inner Asia, it means fertility and luxuriant vegetable growth for the regions of Eastern Asia. Of the original forest area, very little remains, much to the detriment of the people.

Agriculture is the chief industry, and many of the plants which are now cultivated all over the world were first grown in this part of Asia. Here rice, cotton, sugar cane, pepper, cinnamon, bananas and many other fruits were grown centuries ago; and to-day the methods of production are much as they were when Caesar and Alexander in turn ruled the world (see CHINA). The kind of farming known as *intensive* is practiced; the farms are not large but they are worked to the utmost. Even the slopes of the hills are terraced, and many a farmer makes a living from a hillside farm so steep that strong retaining walls are necessary. Animals are comparatively few, for the land is too valuable to be used for grazing.

All through this eastern region minerals abound—gold, silver, copper, mercury, and most important of all, coal. It is in China chiefly that this last mineral is to be found, and this is fortunate; for great deposits of coal might exist in parts of Southern Asia and be of little use to the easy-going, unprogressive people. But the Chinese, like most people who live in a temperate climate and on a soil which yields plentifully in return for hard work, are accustomed to labor, and as a result the Hoang River region, where much of the coal abounds, is becoming increasingly known for its manufactures.

Eastern Asia is fortunate, too, in its rivers, especially the Hoang and the Yangtze. The latter is of great value for transportation, but both have great flood plains which are of as much importance to the people who live upon them as is the famous flood plain of the Nile.

Inhabitants. It must be remembered that Eastern Asia is simply a geographic region, like the others described above; not in any sense is it a country or a political entity. Japan, China and Siam are independent governments, Manchuria is a part of China but, actually, it is commercially far more under the domination of Russia and Japan; Indo-China is a colony of France. But the people in this varied region are practically all of one race—the yellow or Mongol (see RACES OF MEN). Differences of climate and environment have produced variations, the inhabitants of Siam and Indo-China, for instance, in the far south being much less industrious and progressive than the dwellers in the northern section.

To people in a land like North America, which possesses a civilization less than three centuries old, largely imported from another continent, the ages-old civilization of Eastern Asia is almost impossible to understand. Reverence for the past has been the dominant note in the history of the people. If a thing had not been done centuries ago, in the days of their worshiped ancestors, it does not now commend itself, however strong its appeal to common sense; and this tendency for centuries prevented progress on the part of peoples who are beginning to prove themselves capable of making vast strides once they are aroused. See Ancestor Worship.

Southern Asia. This is the tropical section of Asia—the region of intense heat from which European inhabitants must flee if they wish to escape fevers; of heavy drenching rains, which no lands but the tropics or subtropics ever know. Of all the writers who have felt the charm of these southern countries, India, Burma and the Malay peninsula, and have truthfully pictured them, the most widely read is Rudyard Kipling, and it is the Southern Asia of Kipling with which people are most familiar.

The People. Unlike Eastern Asia, Southern Asia is not a region of one race. Over the mountains to the north there came in past centuries horde after horde of invaders who differed in race, in manners, in speech and in civilization; whether these conquered or were themselves subjected, they left their mark upon the country. Of the 300,000,000 inhabitants, some are Aryans, who belong to the white race,—but are easily distinguished from the white men who have come from Europe; some are the yellow or Mongol race, though of a different stock from the Chinese or Japanese. Then there are the Malays, or the brown race, and various representatives of the black race, notably the Dravidians (which see) of India and the Negritos of the Malay Archipelago. Nothing can make more clear this great diversity than the statement that there are spoken in Southern Asia almost 150 languages, and these are not tongues which have been introduced in recent times, as Bohemian or Polish have been introduced into the United States by immigrants, but languages which have been for centuries the speech of the sections in which they still exist.

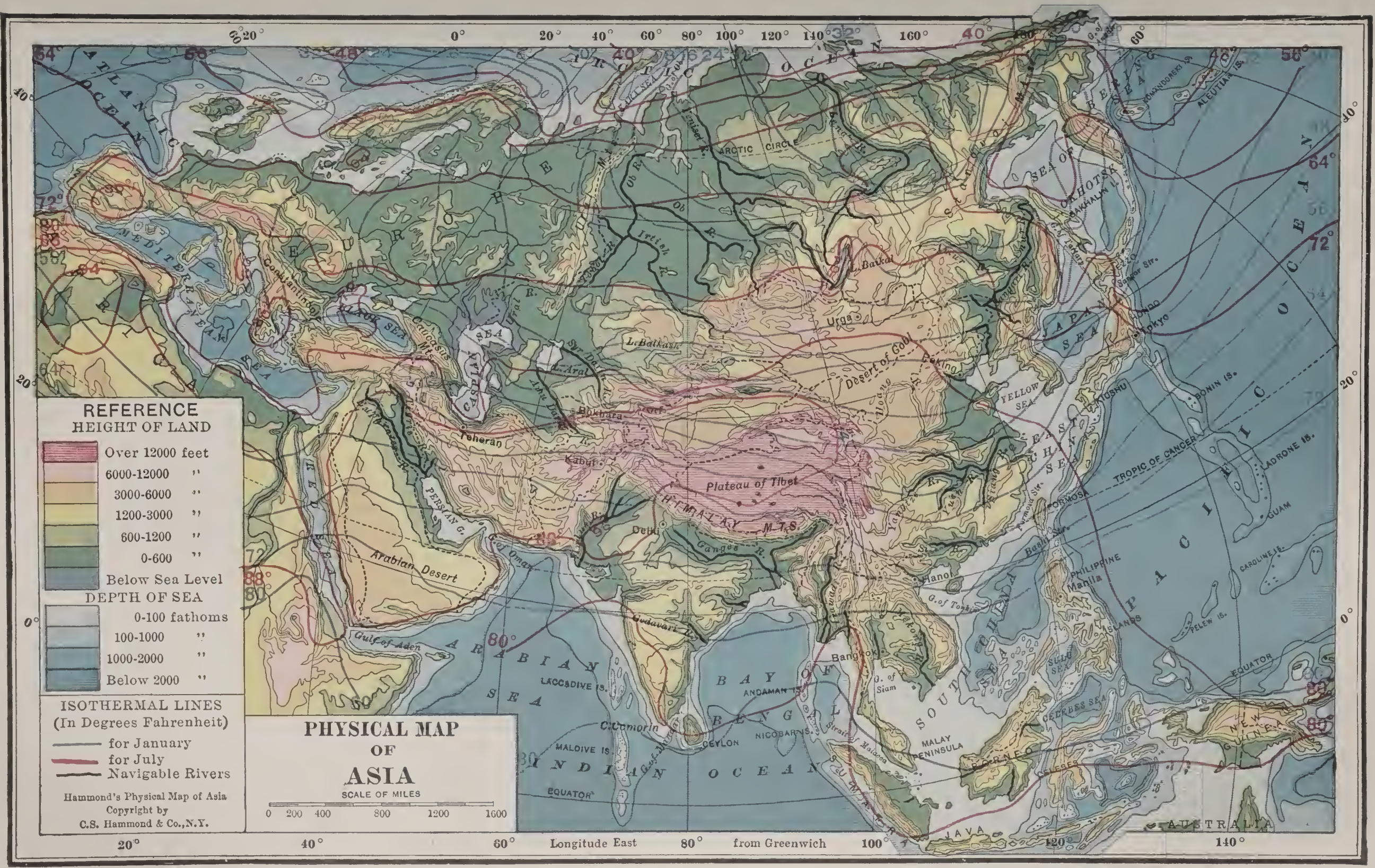
The Land. Southern Asia has 2,000,000 square miles, and scattered over this area is a population almost as dense as that of Eastern Asia. To the north stretch the great mountain systems—the Himalaya, Karakorum and other lesser ranges; but Southern Asia itself is not notably mountainous, save in Burma. Great rivers, the Ganges, the Indus, the Brahmaputra and the Irrawaddy, drain the country and exercise a great influence on its life and commerce. In few places is there scarcity of rainfall, and in certain parts, as Assam, which lies just south of the Himalayas, more rain falls than in any other place in the world. The greatest amount ine one year was 800 inches; the average is 500 inches, or over forty feet.

As in Eastern Asia, the people of Southern Asia have learned through the ages to demand little beyond a bare living, but, unlike the dwellers in the latter region, they are not here forced to work hard for what they have. Few places in the world are more fertile than the great river plains, and rice, sugar and cotton can be grown with very little labor. The cocoanut, the sago palm and the breadfruit tree flourish in certain sections, and often any one of these trees will furnish sustenance for a family.

Animal Life. Southern Asia has the most distinctive animals of any part of the continent—the great jungle beasts which adventurous hunters risk their lives to kill. The tiger, the elephant and the rhinoceros are peculiar to the region, and wolves, monkeys, reptiles and birds abound. In his *Jungle Book* and *Second Jungle Book* Kipling has shown the animal life of the jungle as seen through the eyes of little Mowgli, foster-child in a wolf family. The books make no claim to scientific accuracy, for they give to the animals speech and the power of reasoning, but in one sense they are accurate descriptions, with their account of the great drought and its effects, and of the method of life of the various kinds of animals.

As the other sections of Asia have their distinctive domestic animals, with the exception of Eastern Asia, so Southern Asia has its own—the elephant, which elsewhere is scarcely ever tamed and made a beast of burden. Of course the elephant is not used commonly as is the horse in North America, but there are many tasks which require great strength, as the hauling and stacking of heavy teakwood logs, for which it is excellently adapted. Of cattle, horses, goats or sheep there are few, for the fertile farm lands are too valuable to be given over to grazing.

Southwestern Asia. Of all Asia, this is the part which has most influenced Western civili-



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ECONOMIC MAP OF ASIA

SCALE OF MILES
0 200 400 600 800 1000

REFERENCE

- Industrial Districts
- Agricultural Regions
- Non-Productive "

Principal Workings
- Coal
- Iron
- Tin
- Copper
- Gold
- Petroleum

Agricultural products are indicated by initial letters in districts where the products are largely obtained

Ca	Cacao	Ru	Rubber
Cf	Coffee	S	Silk
Ct	Cotton	Su	Sugar
H	Hemp	T	Tea
J	Jute	To	Tobacco
R	Rice	V	Vineyards
W	Wheat		

—— Navigable Rivers

Hammond's Economic Map of Asia
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VEGETATION MAP OF ASIA

SCALE OF MILES
0 200 400 600 800 1000

REFERENCE

Natural Vegetation

- Ice Desert, Tundra and Alpine Flora
- Coniferous Forest
- Broad-leaved Forest and Meadow
- Evergreen Trees and Shrubs
- Temperate Grasslands
- Semi-desert
- Desert
- Oases and Nile Valley
- Tropical Grasslands
- Tropical Forest

Hammond's Vegetation Map of Asia
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POPULATION MAP OF ASIA

SCALE OF MILES

0 200 400 600 800 1000

REFERENCE

Density of Population to the square mile.

- Under 16 inhabitants.
- 16-32 "
- 32-64 "
- 64-128 "
- 128-256 "
- 256-512 "
- over 512 "

Towns with over 100,000 inhabitants.

Hammond's Population Map of Asia
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EVERY-DAY LIFE IN ASIA

Japanese Baby Carriage

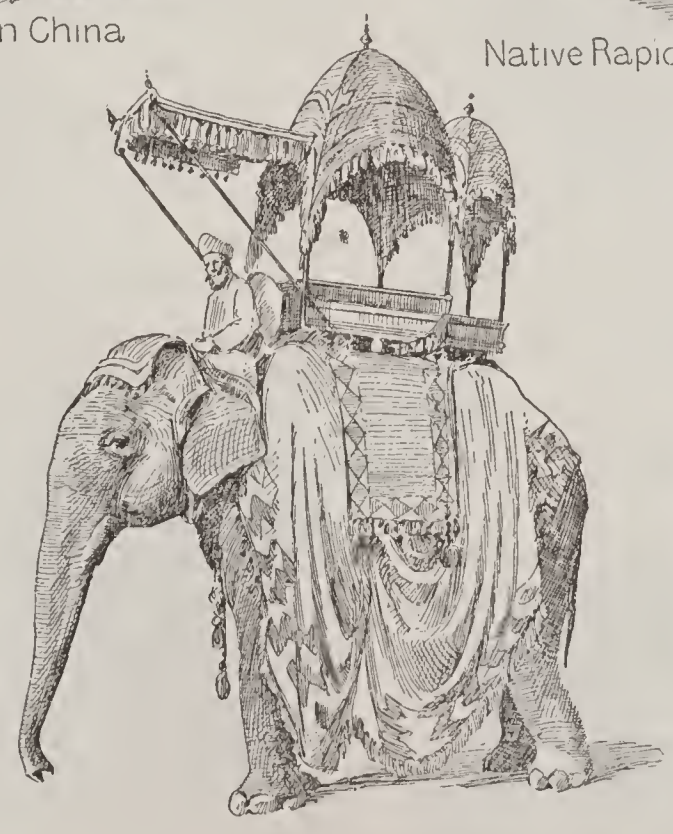
Arab Boys at School

Palestine Shepherd;
The Same After 2000 Years

A Popular Cart in China

Native Rapid Transit in Ceylon

A Siberian Woman,
Lake Baikal Region



Native Automobile of India

A Dog of Tibet and His Master

zation. Arabia, Asia Minor, Persia, Armenia, Syria and Mesopotamia—every part has its vital associations for any student of history. On the fertile flood-plains of the Tigris and Euphrates rivers grew up one of the oldest civilizations in the world, and it is somewhere in Southwestern Asia that tradition places the Garden of Eden. Chaldea, Babylonia, Assyria, Persia, each in succession became a great empire, and with the last-named the first great European people, the Greeks, came into close contact.

The People. But in these regions of early culture, in which grew up many of the useful arts, as that of writing, and many of the sciences, as chemistry, astronomy and algebra, there exists to-day a far lower state of civilization than in regions of a newer growth. Visitors in and near Palestine declare that much of the Bible gathers new force and meaning to those who have visited the scenes in which its narratives are laid, for manners, customs and even dress have changed but little in all the centuries since the marvelous Biblical history was written.

The people of Southwestern Asia are neither so varied in race as those of Southern Asia nor so entirely of one stock as are those of Eastern Asia. Some are Aryans, closely related to the peoples of Europe; some are of Mongol descent and are closely allied to the Turks; and the Arabs, the people who during the Middle Ages were building up the sciences which later meant so much in the development of Europe, are of a race known as Semites, to which the Hebrews also belong. But to whatever race these Southwestern Asiatics belong, there is one tie which unites them—their religion. Almost without exception they are Mohammedans, and of the strictest type. The crusading zeal which inspired the early followers of Mohammed lives on in them, and difficult indeed is it for any heretics to make a home among them. See MOHAMMEDANISM.

To say that the people are Mohammedans is equivalent to saying that they are free from one vice—drunkenness; but from the vice of theft they are by no means free. This, however, is a result of the sort of life many of them lead, and not of their religion. While the majority of the population is gathered in villages and towns, in any section where there is water enough to support community life, the greater part of the land is given over to tribes which wander about with their goats or camels and eke out a scanty existence (see ARABS, subhead *Nomads*). These nomads seem to have almost no sense of property rights—they will help themselves to whatever they require, no matter to whom it may belong, fighting to secure it, if necessary.

The Land. Some fertile, well-watered regions there are in Southwestern Asia, but much of the land is too dry to produce more than the scantiest vegetation. The section has not an abundance of rivers like Eastern or Southern Asia; only the two mentioned above, the Tigris and the Euphrates, attain any importance. The surface of the land is diversified. There are great plains, as in Mesopotamia; lofty plateaus; one of the highest mountain ranges of the world, the Hindu Kush; and the lowest spot in all the earth's surface, the Dead Sea. But highland and lowland are alike in one quality; except near the coast they are too dry to produce crops without irrigation. Where water can be obtained, excellent fruits of the temperate and subtropical varieties can be raised, but over vast stretches of desert and semi-desert land only the date palm flourishes. This, therefore, is one of the chief supports of the people. Probably no book ever written gives a better idea of the life and conditions in this southwestern section of Asia than the *Arabian Nights.*

The Historical Story. In the articles in these volumes on the various countries of Asia, the long chain of events in their history is described, but there have been certain movements which have affected large sections of the continent, regardless of political boundaries. Asia is generally regarded as the cradle of the human race. It possesses in Assyria some of the oldest historical monuments in the world; and the old Testament contains the earliest records of any nation in the form of a consecutive narrative. These Old Testament countries were Asiatic.

It is not impossible to believe that the Aryan race, the dominant race of Europe and consequently of America, had its origin in the Tigris-Euphrates Valley, and spread thence to the southeast and southwest. It was in the days of the Persian Empire that Europe first came into close contact with any section of Asia farther inland than Asia Minor and Phoenicia, and through the conquests of Alexander the Great more and more of the great continent came within the knowledge of Europeans. The Roman Empire had some of its most prosperous colonies in Western Asia.

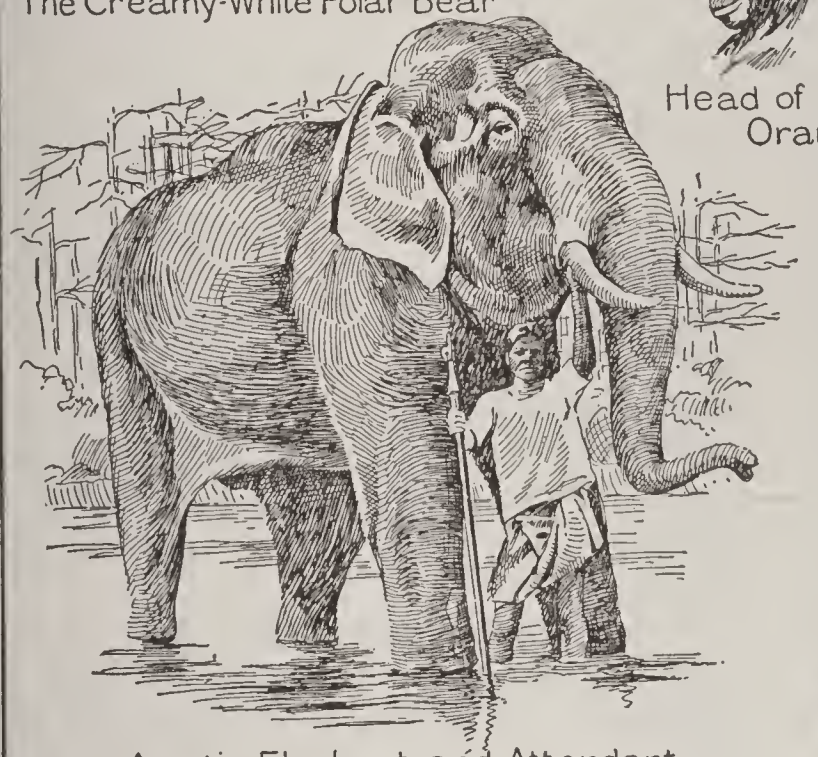
But the intercourse was not to remain always

IMPORTANT ANIMALS OF ASIA

The Creamy-White Polar Bear

Zebu—A Gentle Beast of Burden

Head of Orang-Utan



Asiatic Elephant and Attendant

Crocodile of India

Many-Colored Golden Pheasant

Bactrian Camel—
The Ship of the Desert

Rhinoceros

Tiger—The Fiercest of the Cats

so one-sided—Europeans invading Asia for their own profit. After the rise of Mohammedanism in the seventh century A.D., the fanatical Arabs pushed their sovereignty into Africa and thence into Spain, and for a time it looked as though Europe might become a prey to these zealots from the East. This danger was averted, but Western Asia remained long prominently in the thought of Christian Europe by reason of the Crusades, which were directed against the Saracens in the Holy Land. Meanwhile, a new power was rising in Asia which threatened Europe—the Ottoman Turks, who in 1453 gained a firm foothold on the western continent.

Throughout all this time the rest of Asia was all unknown to Europe, but with the fifteenth and sixteenth centuries conditions changed. Spanish, Dutch, Portuguese and British navigators explored the southern and southeastern coasts, and their governments promptly planted colonies where they had gone and laid the foundations for that dominance of Asia which persists to-day. In the north, Russia was making inroads into Siberia, but the Farthest East, China and Japan, remained wrapped in the obscurity which had shrouded them through all the centuries. Not until the nineteenth century did Western nations force an entrance into these countries which lived in the past, but to-day Western ideals and civilization are making themselves felt throughout Asia, and several of the Asiatic nations have come to play prominent parts in world politics. These statements must not be construed too liberally, for while governments may have adopted more advanced theories and scholars may have discarded much of the old formal learning, the bulk of the people in most countries live to-day as they lived a thousand years ago or more, ignoring and even resenting all attempts to introduce among them new civilization and new faiths. Asia thus remains, as one writer calls it, the "one stronghold of the spirit of the past."

Religions in Asia. An extremely interesting fact in connection with Asia is that every one of the great world religions had there its origin. Brahmanism, Buddhism, Confucianism, Judaism, with its two offshoots of Christianity and Mohammedanism, were all evolved in Asia. Most of them have still their stronghold there, but Christianity has not made much progress in the land of its birth, and has grown slowly in Asia only as the results of almost superhuman efforts on the part of missionaries. To-day there are fewer than 20,000,000 Christians in the whole continent, while Brahmanism has over ten times that number, Buddhism over twenty times and Mohammedanism over eight times. Of these great religions, the two offshoots of Judaism have been the only really militant or missionary faiths.

Other Items of Interest. A representative of the United States Department of Agriculture has spent six years in China, Siberia and Turkestan, searching for trees and plants worth growing in America. Jujubes, for the arid regions; persimmons suitable for drying; bamboos, for eating and for landscape gardening; "strawberry" trees, hawthorns, and new varieties of the cherry and the peach are among those which are proving successful.

Nearly four-fifths of the world's silk comes from Asia.

As far back as 1800 the United States exported more than a million dollars worth of goods to Asia, but until 1897, when the amount was $39,000,000, the trade did not equal that with South America. In 1905 Asia took $128,000,000 worth of American products, but in 1909, only a little more than half as much, whereupon South American business again became more important until 1915. The annual export to Asia is now about $115,000,000, only about four per cent of all the exports of the United States.

United States imports from Asia have always exceeded exports. In 1800 they were over $11,000,000; now they are well over $200,000,000.

Canada sells about $5,000,000 worth of its products to Asiatics, and buys over twice as much from them.

The almost constant struggle between Europe and Asia from earliest times is one of the interesting phases of history. Beginning, according to Herodotus, even earlier than the ten-year siege of Troy which forms the story of the *Iliad,* it was continued in the wars in which Marathon, Thermopylae and Salamis figured, in the expeditions of Alexander, the Roman conquests, the invasions of the Huns, the Saracen inroads, the Crusades and the contest with the Turk which have extended into our own time.

Russia-in-Asia is the largest country on the globe.

Asia is the only continent which rivals North America in tobacco growing, to which over a million acres are devoted, mostly in India.

Rice is Asia's great crop. Its annual produc-

tion of one hundred billion pounds is one hundred times that of Europe, its nearest rival in this respect.

The finest rugs in the world come from Asia; those from Persia, Turkey, Bokhara, Khiva, Turkestan and India are especially prized.

Siberia's wheat crop is about equal to Saskatchewan's.

When Marco Polo's famous book about Asia first appeared people thought it was fiction. But his stories and those of other travelers about the wealth of these far-away regions led to the discovery of America, which all early explorers thought was a part of Asia. See Polo, Marco.

An interesting contrast is observable in the popular names of the founders of two of those great religions which originated in Asia. The Buddha is known, as in Edwin Arnold's poem, as the "Light of Asia," while the founder of Christianity bears the less-localized title of "Light of the World." J.R.

Related Subjects. The reader who wishes more detailed information as to Asia will find it in the following articles:

UNCLASSIFIED TOPICS

Cathay
East Indies
Gobi
Khybu Pass
Levant
Malay Archipelago
Merv
Pamir
Saghalien
Tartary

CITIES AND TOWNS

Not all of the cities and towns of Asia are listed here, as those of Asia Minor, China, India, Japan, Palestine, Siberia and Turkey are indexed under those headings.

Acre
Aden
Antioch
Bangkok
Beirut
Damascus
Gaza
Hanoi
Herat
Ispahan
Kabul
Kashgar
Lhasa
Malacca
Mecca
Medina
Meshhed
Muscat
Nimrud
Nineveh
Palmyra
Seoul
Persepolis
Rangoon
Saigon
Samarkand
Shiraz
Sidon
Susa
Tabriz
Teheran
Tyre
Yarkand

COAST WATERS

Arabian Sea
Arctic Ocean
Bengal, Bay of
Bering Sea
Black Sea
Caspian Sea
China Sea
Indian Ocean
Mediterranean Sea
Okhotsk, Sea of
Pacific Ocean
Persian Gulf
Red Sea
Yellow Sea

LAKES AND SEAS

Aral
Baikal
Balkash
Dead Sea
Galilee, Sea of

MOUNTAINS

Altai
Arafat
Ararat
Carmel
Caucasus
Elburz
Everest, Mount
Fujiyama
Ghats
Hermon
Himalaya
Hindu-Kush
Karakorum
Kuen Lun
Lebanon, Mountains of
Nebo, Mount
Olives, Mount of
Stanovoi
Tabor, Mount
Taurus
Tian-Shan
Yablonoi

PEOPLES

In addition to these, there are in the articles on the various countries subheads treating of the people:

Aino
Arab
Aryan
Bedouins
Dyaks
Kalmucks
Kirghiz
Mahrattas
Mongols
Negritos
Semites
Turks

POLITICAL DIVISIONS

Afghanistan
Annam
Arabia
Armenia
Asia Minor
Assyria
Babylonia
Baluchistan
Bhutan
Bokhara
Cambodia
Chaldea
China
Cochin-China
French Indo-China
Gilead
Hindustan
India
Indo-China
Iran
Japan
Johore
Kashmir
Khiva
Korea
Kurdistan
Media
Mesopotamia
Chosen
Oman
Palestine
Parthia
Persia
Phoenicia
Siam
Straits Settlements
Tibet
Tongking
Turkestan
Turkey
Yemen

RIVERS

Amur
Brahmaputra
Euphrates
Ganges
Hoang-Ho
Hugli
Indus
Irawadi
Jordan
Lena
Mekong
Nerbudda
Obi
Sutlej
Syr-Darya
Tigris
Yalu
Yang-tse-Kiang
Yenisei

CHARACTERISTIC ANIMALS

Bear
Buffalo
Camel
Cobra
Crocodile
Elephant
Lion
Orang-utan
Peacock
Pheasant
Rhinoceros
Tiger
Yak
Zebu

OUTLINE AND QUESTIONS ON ASIA

Outline

I. Position

(1) Latitude, 1° 16′ to 77° 40′ north
(2) Longitude, 26° east to 169° 40′ west
(3) Boundaries (see map)

II. Size

(1) Length, 6,828 miles from east to west
(2) Breadth, 5,270 miles from north to south.
(3) Area, 17,250,000 square miles
(4) Rank, largest land mass in the world
(5) Comparative size

III. Shape and Coast Line

(1) Roughly triangular
(2) Deeply indented coast line
  (a) Estuaries on the north
  (b) Great seas on south and east
(3) Length of coast line
(4) Islands

IV. Climate and Surface

(1) Extremes of temperature
(2) A land of contrasts
(3) Extensive plains
(4) Mountains
  (a) Pamir plateaus
  (b) Chief ranges
(5) Steppes
(6) Low-lying seas

V. People

(1) Isolation of different nations
(2) Characteristics of the yellow race
  (a) Reverence for the past
  (b) Ancestor worship
(3) Malays or brown race in the south
(4) Dravidians and Negritos, the black races
(5) Aryan and Semetic races of the southwest
(6) Religions in Asia
  (a) Brahmanism
  (b) Buddhism
  (c) Confucianism
  (d) Judaism
  (e) Mohammedanism
  (f) Progress of Christianity

VI. Political Divisions

(1) Independent countries
  (a) China
  (b) Japan
  (c) Siam
  (d) Persia
  (e) Oman
  (f) Nepal and small states in Arabia and the Himalayas
(2) Semi-independent countries
  (a) Afghanistan
  (b) Chosen

VII. European Possessions in Asia

(1) Russia
  (a) Siberia
  (b) Turkestan
  (c) Transcaucasia
(2) Great Britain
  (a) India and Burma
  (b) Ceylon
  (c) Straits settlements
(3) Turkey
  (a) Asia Minor
  (b) Armenia and Kurdistan
  (c) Mesopotamia
  (d) Syria and parts of Arabia
(4) France
  (a) French Indo-China
(5) The Netherlands
  (a) Islands in the southeastern archipelago

VII. Northern Asia

(1) Area, 6,660,000 square miles
(2) Physical features
(3) Inhabitants
  (a) Nomadic Turkish tribes
  (b) Mongol tribes in north
  (c) Russian colonists
  (d) Occupations

IX. Inner Asia

(1) Area, 2,500,000 square miles
(2) A region of barrier states
(3) Chinese ownership and Russian influence
(4) Causes of lack of development

X. Southern Asia

(1) Area, 2,000,000 square miles
(2) Surface and climate
(3) Animal life
(4) A region of many races

XI. Southwestern Asia

(1) Historic importance
(2) Diversified physical features
(3) Climate

XII. History

(1) Oldest history in the world
(2) Biblical history
(3) Spread of Mohammedanism
(4) The Crusades
(5) Power of Ottoman Turks
(6) Modern exploration and development by Western nations

Questions

What are the principal countries under Turkish rule?

What are the three great rivers of Siberia? The two chief rivers of China?

What part of the continent has greatly influenced European civilization?

In what way has Asia been connected with the important religions of the world?

Is much tobacco grown in Asia?

Under what European flag do over one-third of the people live?

What are the tundras?

What tendency of the people of Eastern Asia has especially retarded their progress?

What is the tie which unites most of the people of Southwestern Asia?

Name a well-known book about Asia that may have influenced the discovery of America.

What states are independent of European rule?

What is the "roof of the world"?

Why is the region of the Hoang River becoming important in manufacturing?

How do Mohammedans regard drinking?

What kind of cloth is made largely of material from Asia?

Where are most of France's Asiatic possessions?

What occupations have the people of Northern Asia?

What are the four great rivers of Southern Asia?

When did European interest in the Far East begin?

From what parts of Asia do the best rugs come?

How have the mountains affected the story of Asia?

To what race do most of the people of Eastern Asia belong?

In what part of the continent are some of the oldest records of civilization?

Does Siberia raise much wheat?

What is the highest mountain in Asia?

What writer has made many people familiar with Southern Asia?

At what time during the Christian Era did it seem that Europe might come under the sway of Asiatics?

What is Asia's greatest crop? Is it grown to any extent elsewhere?

Why was it easy for Russia to gain a foothold in Asia?

Which of Kipling's books tell us of the animal life?

How large is the trade between Asia and Canada and the United States?

What country has four colonies in Asia which could all be put in a space that you could drive around in one day in an automobile?

Why is agriculture important in Asia?

What is the largest country in the world?

What are some of the seas which surround Asia?

What branches of knowledge originated in Asia?

What interest has Germany in the Far East?

Where does the elephant come from?

What are the divisions of Russia-in-Asia?

When did Europe first learn of the country beyond Asia Minor and Phoenicia?

What effect has the density of population upon Eastern Asia?

What countries of Asia are called semi-independent, and why?

How does the population of Asia compare with that of the world as a whole?

How many miles above the lowest point on the continent is the highest peak?

Why is Northern Asia so sparsely settled?

Why are there so few grazing animals in Eastern Asia?

PRODUCTS

Bananas	Dates
Breadfruit	Gold
Coal	Pepper
Cocoanut	Rice
Cotton	Sugar Cane

HISTORY

Alexander the Great	Christianity
Assyria	Confucius
Brahmanism	Crusades
Buddhism	Mohammedanism

Consult Ross's *The Changing Chinese;* Mahan's *The Problem of Asia;* Curzon's *Problems of the Far East.*

ASIA MINOR, or SMALLER ASIA, the most westerly part of Asia, is the peninsula lying west of the upper Euphrates River. Like Arabia, it is a geographical, but not a political, unit, for never at any time has it had a gov-

That section of the Asiatic continent between the Black and Mediterranean seas is called Asia Minor.

ernment of its own. In ancient times it was divided into a number of small countries, each with its own ruler, and with most of these the Greeks came into close relations. Especially along the coast were Greek colonies numerous, and it was the aid which Greece rendered to some of the Ionian cities of Asia Minor in their attempt to free themselves from the rule of Persia which led to the Persian Wars, commanded by Xerxes.

Under the Roman Empire Asia Minor was prosperous, for it possessed a fertile soil and a pleasant climate, but in modern times, under Turkish rule, it has suffered severely and shows few signs of progress. Its present name is Anatolia, and as such it is merely one of the provinces of the Sultan, with little to suggest its former greatness.

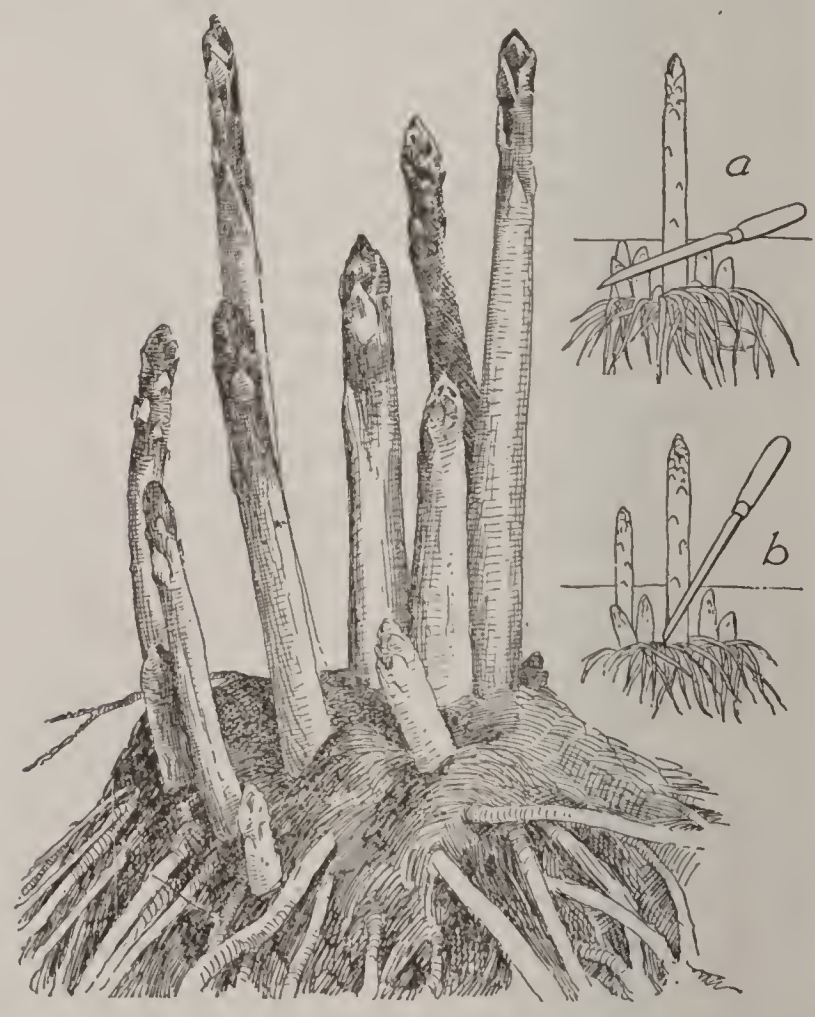
Related Subjects. The following list will furnish to the reader more detailed knowledge of this historically important region of Asia:

Abydos	Cappadocia
Bithynia	Cilicia
Ephesus	Phrygia
Ionia	Pontus
Lydia	Samos
Miletus	Tarsus
Galatia	Taurus

ASP, a species of viper or serpent found in Egypt. It has an exceedingly venomous bite; the poison acts so quickly that its bite is nearly always fatal, death resulting in a few minutes. When approached by man or some other animal the asp assumes a peculiar position of defense; its head is elevated, its neck swells out, and the whole body is raised almost erect. Jugglers and snake-charmers extract the poisonous fangs, and train the asp to perform various tricks. Cleopatra is said to have committed suicide by allowing an asp to bite her.

The name is also given to a serpent common on the European continent, and to an adder of South Africa which the Boers call the *spitting snake.* See SNAKE; SERPENT-CHARMING.

ASPARAGUS, *as pair' a gus,* a plant which furnishes one of the favorite spring vegetables.



ASPARAGUS

(*a*) Wrong method of cutting; (*b*) right method of cutting. Thrust the knife into the ground as vertically as possible, in order not to injure other shoots.

It is not the fruit of the asparagus which is eaten, but the young shoots, which are cut soon after they appear above the ground. These are boiled and eaten either hot, with a cream or butter sauce, or cold, as a salad.

For salads the blanched or whitened variety is much preferred, and it is this variety which is placed on the market in cans. Asparagus is wholesome, but contains so large a proportion of water that its food value is very low.

Asparagus plants should be allowed to grow three years from the seed before they are cut; after that for ten or twelve years they will continue to afford an annual supply if the beds are protected from frost by straw or litter during the winter. The full-grown plant has a beautiful feathery top, shaped like a miniature tree, and bears small flowers and bright red berries. Some varieties are cultivated for ornament and are incorrectly known as ferns. The United States is one of the chief asparagus-growing countries.

ASPASIA, *as pa' she a,* the most celebrated woman of ancient Greece, was born at Miletus, in Ionia. About 460 B.C. she became the wife of Pericles, though their marriage was not regarded as legal because the laws of Athens forbade the union of a citizen with a woman of foreign birth. The wit, beauty and intelligence of Aspasia made her a worthy companion of the talented Pericles, and their home became the meeting place of the most learned and distinguished men of Athens. Their son was given the full rights of citizenship by a special decree. See PERICLES.

ASPEN, or TREMBLING POPLAR, a species of poplar which is native of the cooler parts of Europe and Asia, but common in Canada and the United States. The tree is hardy and grows rapidly. As the slender trunk becomes

ASPEN

(*a*) Young leaves unfolding. The leaves look like white flannel when they open early in the spring. (*b*) Mature leaves. These are ovate in form, sometimes almost round, with fine teeth.

higher the lower branches drop off, leaving a knot surmounted by a roll of bark which appear like eye and eyebrow against the pearly white trunk. The light green, almost circular leaves, with saw-tooth edges, are set upon long, thin stems and flutter in every breath of wind, which suggests the popular name of the tree, the *quaking aspen.* The wood is used to make charcoal and for making bowls, trays, troughs and pails.

ASPHALT, *as' falt,* not *as' fawlt,* a mineral pitch, sometimes called *mineral tar* when it occurs in liquid condition. It is a form of bitumen (which see), and in its natural states is black or brown in color, brittle and glossy. When heated it melts easily and gives off a strong odor, much like that of pitch. Pure asphalt burns without leaving ashes. Large deposits of liquid asphalt are found in the vicinity of Santa Barbara, California, and in Leyte Province, Philippine Islands. Trinidad produces the largest quantity of asphalt in the world, Pitch Lake, from which most of the product is taken, having an area of 114 acres. The asphalt continues to flow into the lake, which is the crater of an old volcano, from some underground source, so that notwithstanding the large quantity taken out each year, the supply remains practically undiminished. About 80,000 tons are taken from the lake each year. What is known as *Bermudez* asphalt is taken from another lake in Venezuela. Another well-known deposit, called *Gilsonite,* is found in Utah.

Asphalt Pavement. Crude asphaltum must be put through a refining process before it can be used to make street paving. As the first step the asphaltum is placed in great tanks and melted down, the material being stirred continually during this process. That the material may melt at a lower temperature than it would otherwise, a certain portion of substance remaining in the tank after crude petroleum has been distilled is put into the asphaltum; all of the oils in the substance are thus saved. The resulting mixture is called *paving cement.* During the process sharp, clean sand is being heated in large revolving drums to a temperature of about 300°. This is added to the mixture according to a certain proportion, a specified amount of carbonate of lime being also added. Then the three substances are thoroughly mixed by means of a number of iron arms, all of which revolve very rapidly. The entire mixture is then ready to be used in laying the pavement. It takes three tons of the crude Trinidad material to make two tons of refined asphalt.

A certain amount of preparation is required before the street is ready for the paving material, for it must be graded and rolled very carefully. Then on the road bed is laid a

layer of hydraulic concrete, which consists of cement, sand and broken stone. This concrete bed is also thoroughly rolled; all of the preliminary work must be very carefully done if the pavement is to be durable. The "street mixture," as the prepared asphalt is called, is laid at a temperature of about 250° or 300°, and is spread down in two coats; the first, called the *cushion* coat, is from one-half to an inch thick, while the outside, or *surface,* coat is of sufficient thickness to make the entire bed of asphalt two and one-half inches thick. With hot rakes the workmen spread the mixture evenly from one side of the street to the other, and the surface is smoothed and finished with heated iron tampers and smoothers. After preliminary rolling, a great steam roller weighing about ten tons is run over the top, but before this machine is used the surface coat is lightly sprinkled with hydraulic cement. Asphalt pavement costs more than wood and macadam and less than granite pavement. In large cities the cost varies from $1.51 to $3.08 per square yard, with about $2.35 as a fair average. See PAVEMENT.

Rock Asphalt is mined by means of blasting. When rock asphalts are used in paving they are merely crushed, reduced to powder through the agency of heat and then compressed in place. Rock asphalt is also made into asphaltic cement and mastic. The latter is prepared by mixing rock asphalt with sand and asphalt. Blocks of this substance are used in making floors, sidewalks and roofing. Utah and Kentucky produce asphaltic limestone. B.A.CO.

Consult Richardson's *Asphalt Construction for Pavements and Highways;* also Twenty-second Annual Report of United States Geological Survey, Part I.

ASPHODEL, *as' fo del,* a name applied to various plants of the lily family, some of which have white, and some yellow, blossoms. The name is especially common in the poetry of all ages, but does not always mean the same flower. Thus Homer, when he speaks of the asphodel meadows of Hades, refers to a pale, drooping flower which the Greeks believed covered the field in the region of the dead, while Pope, when he sings—

> By those happy souls who dwell
> In yellow meads of asphodel,

is referring to the same superstition, but has in mind the cheerful yellow daffodil. Indeed the word *daffodil* is but another form of *asphodel.* The true asphodels, which are chiefly native to the Mediterranean countries, have fleshy roots and funnel-shaped flowers arranged in long, loose clusters. They are excellent garden plants. See DAFFODIL.

ASPHYXIATION, *as fix e a' shun,* the act of rendering one unconscious from a lack of oxygen. In asphyxiation the heart continues to drive the blood through the system in an unpurified condition, until death follows. Suffocation from poisonous gases and drowning are the two chief causes of asphyxiation. The restoration of asphyxiated persons in many cases has been successfully accomplished after death had apparently come, so the work of restoration should be persistently followed without discouragement. An attempt should be made to maintain the heat of the body and to secure the inflation of the lungs, as in the case of the apparently drowned. For a reliable method of inducing respiration, see the article DROWNING. One should never wait for a mechanical appliance such as the pulmotor to be brought, as the restoration of a partially-suffocated person depends upon immediate efforts at relief. Inducing respiration by manual methods has proven in many cases to be more advantageous than the use of a mechanical device. See PULMOTOR. W.A.E.

ASQUITH, *as' kwith,* HERBERT HENRY (1852-), an English statesman, Prime Minister during one of the most critical periods in

HERBERT HENRY ASQUITH

British history. His ministry was notable for the budget of 1909 (see LLOYD-GEORGE, DAVID), for the Parliament Act of 1911 which abolished the veto power of the House of Lords, for the struggle for Home Rule in Ireland, and finally

TRINIDAD ASPHALT LAKE.

Panoramic view of a portion of the most extensive deposits of asphalt in the world. Nearly 4,000,000 tons had been removed to the year 1917, and the supply is undiminished.

TRINIDAD ASPHALT LAKE.

At top: Close views of surface of lake; gas emerging through surface water. Center: Method of conveying asphalt from train to vessel. At bottom: left, showing asphalt surface a series of folds, with water between the creases; right, digging and loading.

for the War of the Nations. Personally considered cold, somewhat unsympathetic, and lacking in magnetism, Asquith yet was able to hold together the Liberal party.

Two years after his graduation with honors from Balliol College, Oxford, Asquith began the practice of law, and though not a brilliant lawyer he was distinguished for sound judgment and clear thinking, qualities which marked him in Parliament. His long service in the House of Commons began in 1886. In 1892 he became Secretary for Home Affairs in Gladstone's last ministry, and from 1895 to 1905 was one of the leaders of the opposition, being the recognized spokesman of the Rosebery Liberal Imperialists, who supported the government during the South African War. He opposed Chamberlain's proposal of a protective tariff, and made skilful use of this issue to unite the various Liberal factions. His appointment to the Cabinet in 1905 was a natural result, and as Chancellor of the Exchequer he was really the government leader because of Sir Henry Campbell-Bannerman's poor health. In 1908 he succeeded Campbell-Bannerman as Prime Minister, thus becoming leader in name as he had been in fact. The Asquith Ministry underwent reorganization in May, 1915, a number of prominent Conservatives being included to form a coalition, and in December, 1916, Asquith himself resigned, being succeeded by David Lloyd George.

ASS, an animal of the horse family, the difference between them being observed in the larger size and the shorter ears of the horse. In shape the ass also resembles the zebra. In its wild state, in the plains of Arabia, the ass is a handsome animal, fleeter than the horse, courageous and intelligent. The domestic ass is noted for its dullness, obstinacy and general downtrodden appearance. In the East the ass has been valued for centuries as a beast of burden, and in Africa it is the only beast used in certain districts where the deadly tsetse fly is found, for it is the only animal immune to that insect's fatal bite.

The male ass is of high value for breeding purposes, the offspring of an ass and a mare being called a *mule,* which is superior as a draught animal. The domestic ass is noted for its ability to subsist on the coarsest food, and small quantities of even that. It responds quickly, however, to good treatment, which it too seldom gets. The milk of the ass is nutritious, and in parts of Northern Africa large herds are kept solely as milk animals.

The term *ass,* as one of contempt, is applied to human beings who are dull, stupid or obstinate.

ASSAM, *as sam',* a province of British India, with an area of 53,000 square miles. In 1905 Assam was politically joined to the province of Bengal, but in the reorganization of the Indian provinces in 1912 it was again given its former position as a separate state. It lies on the Indian frontier, to the south of Tibet. The climate is marked by the heaviest rainfall in the world, averaging 500 inches annually; it has reached 800 inches, or nearly seventy feet, records show. Malarial diseases are common in the low grounds; otherwise it is not unhealthful.

A large part of the province may be designated as forests or jungle, the trees including teak, date and sago palm and the Indian fig-tree. In the jungles roam the elephant, rhinoceros, tiger, buffalo, leopard, bear, wild hog, jackal, fox, goat and various kinds of deer. Among serpents are the python and the cobra. Pheasants, partridges, snipe, wild peacock and many kinds of water-fowl abound. Coal, petroleum and limestone are found in abundance, iron is smelted to a small extent and gold-dust is found in small quantities. The article of most commercial importance is tea, the yield of which is now over 295,000,000 pounds annually. Other crops raised are rice, Indian corn, pulse, oil-seeds, sugar cane, hemp, jute and potatoes. The population is about 7,500,000, nearly 4,000,000 of whom are Hindus, 1,886,500 Mohammedans, and a small part of the rest Christians. The seat of the government, at the head of which is a British chief commissioner, is Shillong.

ASSASSINA'TION is murder done treacherously, either for pay or for revenge. The name came from *Assassins,* a society which in the twelfth century was powerful in Persia and Asia Minor and which caused the murder of all who opposed the society. The work of assassination fell upon a band chosen for the purpose, and they were stimulated to carry out their orders by the influence of *hashish* (which see). From this habit they obtained the name *hashishin,* or *hemp-eaters.*

Assassination, as generally understood, means the murder of a public personage. The assassin may be hired by some one who hopes to gain his end by the death of his victim, or he may commit the murder to satisfy his desire to avenge fancied or real grievance, or in hope that through the death of his victim he

will establish some reform, religious or political. In ancient times the assassination of rulers and other high public officials was often applauded. The assassination of Julius Caesar and a number of Roman emperors is a good illustration. Now, however, the brutal killing of a public personage is looked upon as the highest possible crime, punishable by death.

Since 1900 the following European rulers have been assassinated:

Humbert of Italy, July 29, 1900.
Alexander of Servia and Draga, his queen, June 11, 1903.
King Carlos I and son, of Portugal, February 1, 1908.

Three presidents of the United States have been assassinated:

Abraham Lincoln, April 14, 1865.
James A. Garfield, July 2, 1881.
William McKinley, September 6, 1901.

The assassination of the Archduke Francis Ferdinand of Austria and his wife, June 28, 1914, was assigned as one of the causes of the War of the Nations, which began one month later.

ASSAULT, *as salt',* **AND BATTERY,** in law, an attempt, real or apparent, to do bodily harm to another, the circumstances indicating intent and present ability to do actual violence. When the attacking party reaches and touches the person of the victim, battery is added to assault; for, to touch in anger, or to use violence against another in any way constitutes battery. The two offenses are separate and distinct, but they usually occur together and are punished as one. There are, however, some instances of assault without any battery. Assault and battery is a crime punishable by fine or imprisonment, and it is also a civil offense. The person injured can sue for and recover damages from the offender. In applying physical punishment to those under their care, parents and teachers must use only the force necessary in each case, any excess being considered assault and battery.

ASSAYING, *as say' ing,* or determining the amount of the different metals which are contained in a sample of ore, of bullion or of alloy, is carried on in many different ways, according to the kind of mineral to be measured. In general the processes are known as *wet* or as *dry.*

The Dry Process. In this method heat is usually employed to separate the metals contained in the sample. If, for instance, the assayer wishes to find the amount of gold and silver in samples of ore, he mixes the latter with lead and melts them in a *muffle,* which is a clay oven about the size of a drain tile, with an arched roof and air-openings at the side. All the impurities flow off, leaving the gold and silver surrounded by molten lead and oxide of lead. The next step in the process is called *cupellation.* The mass of gold, silver and lead is placed in a cupel, a small, exceedingly porous cup made of a paste of bone-ash and water. When the cupel is placed in the muffle the lead is oxidized by the air which passes over it, and all the oxide disappears in vapor or is absorbed by the porous walls of the cupel. Only gold and silver now remains, and these two are separated by the application of nitric acid, which dissolves the silver. The difference between the weight of the gold and silver together and of the remaining gold gives the weight of the silver.

The Wet Process. In this form of assaying, the metals are dissolved out of the ore or alloy which contains them by applying certain chemicals, then weighed, or measured according to the effect they have chemically. Thus, if the silver washed out by the nitric acid in the last step of the dry process described above is combined with a solution of salt and the resulting white powder, chloride of silver, is weighed, the amount of silver is known from the established chemical formulas. In assaying silver bullion at mints and essay offices the exact amount of salt solution necessary to separate the silver is measured as it is poured out, and from this the amount of silver is known.

Assay Office, a government bureau under the direction of the Treasury Department, which purchases, refines and sells gold and silver bullion, but does not strike coins. There are assay offices in the United States at New York, Carson City, Nev., Denver, Colo., Boise, Ida., Helena, Mont., Charlotte, N. C., Saint Louis, Mo., Deadwood, S. D., Seattle, Wash., New Orleans, La., and Salt Lake City, Utah. In Canada assaying is under the supervision of the Royal Mint. F.ST.A.

ASSEM'BLY, one of the names often applied to a state legislature, or to the state house of representatives as contrasted with the senate. See LEGISLATURE.

ASSESSOR, *a ses' er,* an officer whose duty it is to make a list of all the property in the territory over which his authority extends, for purposes of taxation. The list must contain the name of the owner and the kind and value of his property. If the owner has both real

and personal property, each must be listed separately. The assessor is usually a township or city officer. Large cities are divided into districts and a deputy assessor is appointed for each, or there is a board of assessors, as the duties are too burdensome for one man. In townships the assessor is usually elected by the people. In most instances he is not a salaried officer, but is paid for time actually employed.

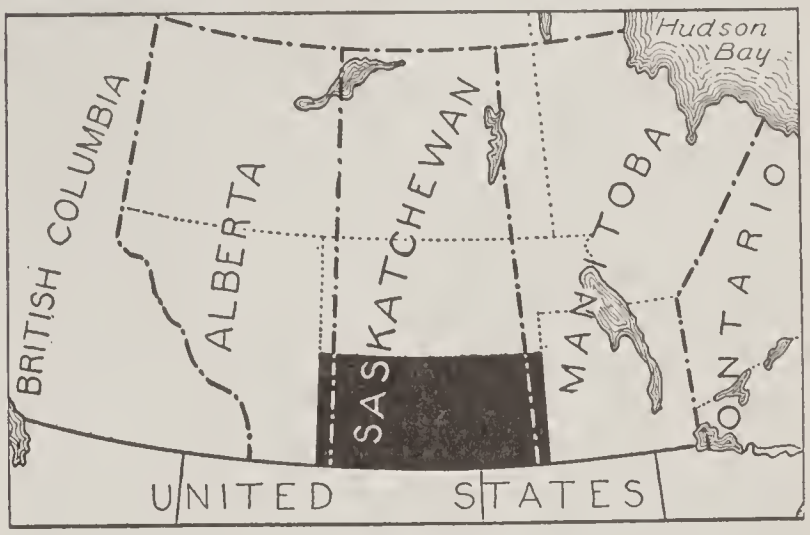
ASSIGNMENT, *a sign' ment,* a legal term meaning the transfer, or making over, of personal or real property or rights in that property. The person transferring the property is the *assignor;* the one to whom it is assigned is the *assignee.* Assignments are legal only if made in writing. A person can assign both property which he already possesses and that which he expects to possess. A farmer may assign his growing crops, and a laborer may assign his wages. Contracts for personal service, trusts and guardianships cannot be assigned. There is no particular legal form necessary to make an assignment valid; a clear statement showing intent is sufficient, although when the matter at issue is unusually important it is advisable to consult an attorney.

ASSIMILATION, *a sim i la' shun,* the process by which the nutritive elements of food are changed into living tissue. This change takes place in the cells (see CELL). In animals and man the circulating blood brings to the cells the materials which they have the power of changing and so adapting to their own uses that they grow and become capable of performing new and even different functions. In order that assimilation should take place rapidly in any organ, there must be a large supply of blood. This is the case in muscle and nerve tissue, while in bone, which changes more slowly, the blood-vessels or capillaries are fewer. The blood itself must circulate with a normal degree of rapidity, be of sufficient amount and composed of proper materials. There must also be taken into the system a sufficient quantity of food that is of good quality and easily digested. In plant life, it involves the transforming of inorganic materials into tissues. See DIET; NUTRITION; SECRETION.

Assimilation, when used in regard to the operations of the mind, means the interpretation of any new object or phenomenon by means of what one has already learned through previous experience with similar objects or phenomena. After the period of infancy, one rarely learns anything new except by the process of assimilation.

ASSINIBOIA, *as i ni boy' a,* SASK., a town 125 miles southwest of Regina and ninety-five miles west of Weyburn. It is the first divisional point on the Winnipeg-Lethbridge branch of the Canadian Pacific Railway and is also the terminus of the branch line connecting it directly with Moose Jaw. The first town lot was sold on October 11, 1912, and on January 1, 1913, Assiniboia was incorporated. From a spot on the prairie it had grown, by 1916, to a town of 1,500 people. The vicinity is a rich mixed-farming district, raising chiefly flax, wheat and oats. The business of the town is chiefly in grains, agricultural implements and other farm supplies, and in lumber and oil. Within a radius of seven miles are large deposits of lignite coal, gravel, sand and fire-brick clay. A $25,000 schoolhouse is conspicuous among the buildings in the town.

Assiniboia, a former district of Canada. It was organized in 1882 as a part of the Northwest Territories (which see), and in 1905 became a part of the new province of Saskatchewan. It extended from the present western boundary of Manitoba to a point a short distance beyond the present western boundary of Saskatchewan, and from the international boundary northward to an east-and-west line drawn just south of the city of Saskatoon. The area of this district was 90,000 square miles. For details of the physical characteristics, climate, natural resources and products, see SASKATCHEWAN.



ASSINIBOIA

The section in solid black was the former district of Assiniboia. The light, dotted lines indicate the boundaries of other districts prior to 1905, and the heavy, broken lines mark present provincial boundaries.

ASSINIBOIN, *a sin' i boyn,* which means *one who cooks by stones,* is the name given to an Indian tribe of the Sioux family, because when first known by white men they

boiled water by dropping hot stones into it. They lived between the Missouri and Saskatchewan rivers, on both sides of the Canadian border. About 1,250 are now on reservations near forts Baldwin and Peck in Montana, and a slightly larger number live in Canada.

ASSINIBOINE, *a sin' i boyn,* a river of Southern Saskatchewan and Manitoba, the chief tributary of the Red River, into which it flows at the city of Winnipeg. The Assiniboine proper rises in Eastern Saskatchewan, near the Manitoba boundary, and flows southward for 200 miles to meet the Qu'Appelle, which rises about fifty miles northwest of Moose Jaw and flows eastward for 270 miles. From this junction to the mouth of the Assiniboine at Winnipeg is a course of about 250 miles, through some of the richest grain lands of the Dominion. Near Brandon, Man., the Assiniboine is joined from the south by the Souris, which rises in the southeastern corner of Saskatchewan, makes a wide bend through North Dakota, and then returns northward. The drainage area of this combined system is 52,600 square miles.

ASSINIBOINE, Mount, one of the rugged and most beautiful peaks in the Canadian Rockies. It lies on the boundary between Alberta and British Columbia, twenty miles south of Banff, and rises to an altitude of 11,860 feet. Its shape is somewhat triangular, like that of the Matterhorn in Switzerland, and like the Matterhorn it is extremely difficult to climb. The east face is a sheer precipice, and the west face, though less steep, is covered with ice and snow, which frequently break loose in great avalanches. The lower part of the northern slope presents three distinct faces, which attain an angle of 80° where they merge into the final spire. The first ascent of Mount Assiniboine was made in 1901.

ASSOCIATED PRESS, an organization composed of the publishers of daily newspapers who thus combine to furnish each other with the important news of the day. No newspaper not a member of the Associated Press may receive its dispatches.

With a view to making this service of the greatest value, the United States is divided into four geographical sections. News dispatches are sent to the headquarters of each division; those that are of national interest are telegraphed to all members in the four sections; those of more local importance but without general news value are sent only to those papers in sections where they are available for use.

The Associated Press is a close corporation. In great cities a certain number of franchises, or memberships, are available, for it would clearly be against public interest in a great metropolis if there were but one member of this greatest news-gathering organization. However, in small cities but one paper can be a member of the Associated Press. Members do not pay a fixed sum per year, but the cost of maintenance of the service is pro-rated among all members.

The Associated Press employs correspondents to represent it in all the great cities of the world, but no papers in Europe are members. European journals are served by their local press associations, among which the Reuter and the Havas agencies are probably the largest.

There are in the United States other agencies with a wide field, but none other is so great or so influential. Among these minor organizations may be named the United Press, the Scripps League and the International News Service.

ASSOCIATION, Law of, in psychology, denotes the way the mind travels from one idea to another. The conditions under which a thought suggests another are classified by psychologists under four general laws, as follows:

(1) Those ideas which are perceived together, or *contiguity;*

(2) Ideas following each other in order of time, or *succession;*

(3) Those ideas which bear a close likeness to each other, or *similarity;*

(4) Those ideas which are opposite in meaning, or *contrast.*

We also recall experiences that have occurred together or in the order in which they are experienced, by their similarity, and sometimes, though rarely, by their contrast. If you will picture your breakfast table in your mind's eye, you will find that this will bring up images or memories of the people you saw at breakfast, the things that were said there, and so on. If you will follow the images that come into the mind long enough you will find that they come in about the order they were experienced through the day. The child remembers his multiplication table in the order of 1, 2, 3, and if he attempts to say it backwards he has trouble. See Psychology; Habit; Memory.

ASSOCIATION FOOTBALL. See Football, subtitle *Association Football.*

ASSUAN, *a swahn'*, an Egyptian town famous in both ancient and modern times. In the days of the Pharaohs, granite for the huge obelisks and statues was quarried near Assuan, which was at the head of navigation

ASSUAN DAM

One of the world's great engineering works, the controlling factor in a vast irrigation project.

on the Nile, just below the first cataract. Five miles south of the town was the famous temple of Philae. To-day Assuan owes its reputation to the great dam which British engineers have built four miles above it, to store the Nile waters for irrigation. Locally Assuan is known as a center for caravan trade with Sudan, for the railroad from Cairo ends near the first cataract. The population in 1917 was 11,293.

The Dam. This structure is a mile and a quarter long and 144 feet high. It is not a solid wall, but is broken by 123 sluice openings for discharging the water as needed for irrigation. The discharge through these openings may amount to 1,500 tons per second. This dam was begun in 1898 and finished in 1902, and it is one of the greatest engineering works in the world. In 1907-1909 the wall was thickened, and raised sixteen feet to its present height, submerging the temple of Philae. On top of the wall is a driveway twenty-nine feet six inches wide. The Nile above the dam (to the south) has been converted into a lake, which extends up-stream for nearly a hundred miles and contains enough water to irrigate 6,000,000 acres. See IRRIGATION.

ASSUMPTION, *as sump' shun,* FEAST OF THE, a festival of the Christian Church, observed on the 15th of August by Roman and Greek Catholics, in memory of the miracle through which the soul and body of the Virgin Mary were taken into heaven by Christ and the angels. It was first celebrated in the Greek Church in 582, and in the Roman Church in the seventh century. This festival is not observed by the Church of England, nor by any other of the Protestant churches.

The Assumption in Art. The story of the Assumption lends itself beautifully to treatment by painters, and is a favorite subject in religious art. *The Assumption,* painted by Titian, now in Venice, pictures the Virgin being carried to heaven on shining clouds, while rejoicing angels surround her, and from the earth the apostles gaze upward with wonder in their faces. Titian has another painting of this title in the Cathedral of Verona. The painting by Rubens, which was secured by the cathedral at Antwerp, Belgium, shows the Virgin ascending to heaven with the angels, and below an empty tomb, about which several of the apostles and a number of women are standing. This picture, with others, was removed from the city for safe keeping when the Germans invaded Belgium in the War of the Nations, in August, 1914. The Virgin in the canvas of Perugino, in Florence, is one of that artist's most beautiful portraits. This painting has, besides the Virgin, four saints in the foreground.

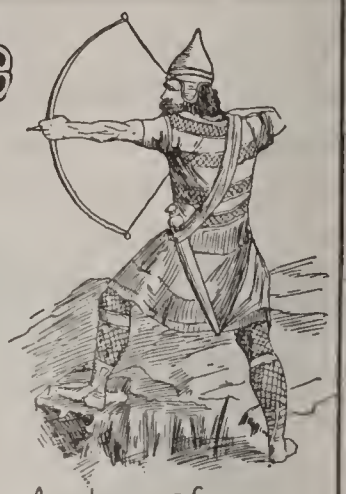
Another beautiful canvas is that by Murillo, in the Hermitage Museum, Petrograd, in which the Virgin is seen floating upward on clouds, while bands of cherubs rise with her. Among frescoes picturing the ascent of the Virgin are those of Correggio, in the cupola of the Cathedral of Parma, Italy, and of Ferrari, in the Church of San Cristoforo, in Vercelli, Italy. (See each artist named, in his alphabetical position in these volumes; also the article PAINTING.)

ASSURBANIPAL, *as shoor bah' ne pal,* (668-624 B. C.), called by the Greeks SARDANAPALUS, was the last great king of Assyria, distinguished for his interest in art and literature. He erected magnificent buildings in Nineveh, the capital city, as well as in other cities of Babylonia, and in his royal palace gathered together

Spearman Armed for Conflict

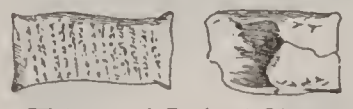
ASSYRIA

Principal Events	B.C.
Tiglath-Pileser I	1130
Assur-Nazir-Pal	883
Tiglath-Pileser II	745
Ten Tribes of Israel Captured	722
Sennacherib	701
Esarhaddon	680
Assur-Bani Pal	668
Fall of Nineveh	606



Archer of Assyrian Army

Winged Bull



Cuneiform Writing and Tablet of Baked Clay on which Records were Preserved. Envelope for Tablet.

Assur
Chief Assyrian Deity

a great collection of Assyrian and Babylonian writings. The remains of this famous library, consisting of thousands of clay tablets, are now in the British Museum. Assurbanipal was also a great warrior. He fought the Egyptians, captured the city of Tyre, and cruelly laid waste the country of Elam, to the southeast, as a punishment for aiding Babylonia, which had rebelled against him. Eighteen years after his death the Assyrian monarchy came to an end.

The name of this monarch is also spelled *Ashurbanipal*. See ASSYRIA.

ASSYRIA, *a seer' i a,* the ancient name of a country lying west of the Tigris River and north of Babylonia, forming with that country the cradle of civilization. Along its eastern boundary rose the mountains of modern Kurdistan; on the north lay the country of Armenia. Assyria was the head of a great military empire that in the seventh century B. C. stretched from the Black Sea to the Persian Gulf, from the frontiers of India to the Mediterranean, and included Egypt. So closely connected were the Assyrians and Babylonians in their geography, their history and their customs, that historians do not find it easy to treat separately these two ancient peoples, the pioneers of the world's civilization.

Geography. Assyria was a fertile plain with low ranges of hills and shallow valleys, through which the great tributaries of the Tigris flowed. The Assyrians in early times built a network of canals, so that the land was under irrigation when rain failed them, and they cultivated olives, vines, fruits and vegetables. From the hills they procured iron, copper and lead; from the neighboring mountains, limestone, sandstone, alabaster and basalt. Assur, on the west bank of the Tigris, and the city from which the country took its name, was the oldest capital; Calah, a later capital, lay on the east bank, on the site of the modern Nimrud. Nineveh, the city that became the permanent seat of government, was located twelve miles north of Calah. The modern town of Erbil, near the mountains on the east, is built on the site of the ancient Arbela, which gave its name to the famous battle won in 331 B. C. by Alexander the Great.

People. Assyria was settled, probably as early as 2500 B. C., by colonists from Babylonia, who were of Semetic stock. Though they resembled their Babylonian kinsmen in many

ways, the Assyrians were the more rugged and warlike; their energy in extending their territory has given them the name "Romans of Asia." The Assyrian kings inflicted the cruelest torture on prisoners of war. Stone slabs recovered from the ruins of the palaces have sculptured on them pictures of conquered kings with hooks thrust through their lips; other prisoners are being whipped to death, and some are having their tongues torn out. Hunting, also, was the delight of the kings of Assyria, and they were as careful in recording the number of wild beasts slain as the number of cities that were captured.

The religion of the Assyrians was practically that of the Babylonians, a worship of many gods, but the former had a distinct national deity in Assur, creator of heaven and earth. They were a literary people, using for the most part tablets of baked clay as a writing material. Assurbanipal, the last great king of Assyria, collected a library of thousands of these tablets, many of which have been unearthed from the ruins of the king's palace at Nineveh, and placed on view in the British Museum. The characters on these tablets have the shape of a wedge, a form of writing that is known as cuneiform (see CUNEIFORM INSCRIPTIONS). Assyrian literature consisted of hymns to the gods, mythological poems, and writings on law, science and history. These people had a well-organized form of government. The kings exercised unlimited power, but appointed governors to rule over the cities, and were assisted by other officers in various ways.

Art. The Assyrians made remarkable progress in sculpture. From the ruins of their buildings there have been unearthed two-winged, human-headed lions and bulls twelve feet in height, besides a large number of stone slabs decorated with raised figures that picture scenes in Assyrian life and history. These show how the soldiers marched, encamped, crossed rivers, attacked cities, cooked, tortured enemies and sacrificed to the gods, or picture the king banqueting with the queen and hunting lions with his court. Their sculptors worked chiefly in soft limestone.

Assyrian architecture was more or less a copy of the Babylonian. Sun-dried brick, as in Babylonia, was used in building, but the Assyrians often faced their foundations and walls with stone slabs. Their palaces were four-sided, and their temples had the shape of a pyramid. These buildings were erected on great terraces or platforms; that at Nineveh, on which the royal palace stood, covered an area of about one hundred acres and was nearly seventy feet in height. Though only one story high, the palaces of the kings were often of a magnificence that no age has surpassed, and their many courts, chambers and passage-ways sometimes spread over twenty or twenty-five acres. The decorations, consisting of stucco work, panels of precious woods, enameled bricks and sculptured slabs, produced a striking effect. At the gates of the palaces, to guard the approach, were placed the great man-headed bulls and winged lions. The industrial arts were highly developed. The king and his courtiers dressed in richly embroidered and figured stuffs; their arms and armor were highly finished; the king's throne was of carved ivory and wrought gold, and he was served from superbly decorated gold, silver and bronze vessels.

History. In the dim light of early Assyrian history, the names of kings begin to appear about 2250 B.C., and the first periods are largely records of military campaigns. In the twelfth century, under the leadership of Tiglath-Pileser I, the Assyrians gained in a large measure control over Babylonia. With this ruler began that devotion to the arts for which Assyrian monarchs were famous. After three centuries there arose a strong ruler named Assurnazirpal, who waged vigorous wars on all sides and made Assyria a great empire. Nineveh, which in the eleventh century had been made the capital, rose to the position of mistress of the Eastern world. The successors of Assurnazirpal pushed their armies in a westerly direction, making conquests in Syria and Phoenicia.

Sargon II was the founder of the last and most glorious dynasty of Assyria (722-705 B.C.). He completely conquered Babylonia, overcame the Hittites, put an end to the Kingdom of Israel and made Judah and the Mediterranean cities pay tribute. His successors, Sennacherib, Esarhaddon and Assurbanipal (Sardanapalus), were kept busy maintaining the supremacy of the Assyrian power over the broad realm. Under Assurbanipal, Assyria rose to the height of its greatness; from the frontiers of India to the Mediterranean Sea its rule was supreme. But as the treasures of the world poured into the capital, the people became fond of ease and luxury and would not go to war to protect their foreign possessions. Province after province revolted, and after

Outline and Questions on Assyria

I. Position and Size

(1) Varied in extent
(2) Present boundaries

II. The Land

(1) Fertile plain
(2) Low hills
(3) Irrigation and cultivation of the soil
(4) Mineral wealth

III. Inhabitants

(1) A Semetic people
(2) Characteristics
(3) Religion, learning and art
(4) Luxury of ancient life
(5) Industrial arts

IV. History

(1) Beginnings of Assyrian power
(2) Conquest of Babylonia
(3) Supremacy of Assyria
(4) Decline of power
(5) Overthrow of kingdom by Medes and Babylonians
(6) Later conquests
(7) Turkish possession

Questions

How was the winged lion of Assyria used?

In what way was the history of the country bound up with Biblical history?

In what century did it reach the height of its glory?

How did Nineveh rank among the cities of the East?

Did the Assyrian farmers, in years of drought, lose all their crops?

To how many nations did the territory known as Assyria belong in the course of its history?

Justify the title, "Romans of Asia," as applied to the Assyrians.

What brought about the decline of power?

Did the royal palaces indicate a high or a low order of civilization?

What was the form of the written characters?

How have we learned many facts about the military and court life of Assyria?

the death of Assurbanipal the decline of Assyrian power was rapid.

Finally, in 606 B.C., the Babylonians under Nabopolassar, the Chaldean, with the aid of the Medes, overthrew Nineveh, which Xenophon, 200 years later, leading the retreating 10,000 Greeks, saw as a crumbling mass of ruins, without a name (see ANABASIS). Assyria was then divided between the Medes and Babylonians. It was afterwards a province of the Persian Empire, was conquered by Alexander the Great, and after his death was ruled by his successors. Coming later under Parthian, Roman and Persian rule, it was seized by the Turks in 1638, and since then has been a part of the Turkish Empire. See BABYLONIA; NINEVEH; ASSURBANIPAL. E.D.F.

Consult Maspero's *The Struggle of the Nations;* Smith's *Ancient History from the Monuments.*

ASTARTE, *as tahr' te,* the principal female deity of the Phoenicians, was the goddess of fruitfulness and fertility. She was worshiped under various names by other ancient peoples, and was sometimes regarded as the goddess of the moon and of hunting. She was identified with the Greek Aphrodite and also with Artemis, with the Ishtar of the Assyrians and Babylonians, and with the Isis of the Egyptians. In the Old Testament this goddess is mentioned again and again under the name Ashtoreth. In *II Kings,* XXIII, 13, it is told that King Josiah tore down an altar which Solomon had built in her honor, and other passages show that the Israelites often turned from their true religion to her worship. The planet Venus was her star. See APHRODITE; ARTEMIS; MYTHOLOGY.

ASTER, *as' tur,* from the Greek word for *star,* a group of plants which were given their name because of the star-like appearance of their flowers. This group includes several hundred species, which grow in abundance in North America and more sparingly in Asia, Europe and South America. The flowers resemble those of the daisy, and in England, where asters are in bloom late in September, at the time of the feast of Michaelmas, they are known as the Michaelmas daisy.

The various species show many charming shades of color, ranging from white to dark purple, and including bright rosy-lilac, pink, rose, crimson, pale blue and violet. Among the more showy varieties, none is more beautiful than the stately China aster, which sometimes grows in gardens to a height of eighteen

inches. Asters flower late in summer and in some places blossom until November or December. They adapt themselves readily to cultivation and are popular garden plants.

ASTERS

Every aster in my hand
Goes home loaded with a thought.
—From EMERSON'S *The Apology.*

Many poets have told of the late-flowering habits of the aster, none more beautifully than Bryant, in his *Death of the Flowers:*

The windflower and the violet, they perished long ago,
And the brier-rose and the orchis died amid the summer glow;
But on the hills the golden rod, and the aster in the wood,
And the yellow sunflower by the brook, in autumn beauty stood.

ASTEROIDS, *as'ter oyds,* or **PLANETOIDS,** the name of a group of many minor planets, revolving between the orbits of Mars and Jupiter, and occupying a place in the solar system which would naturally belong to a planet. The diameter of the largest does not exceed 488 miles, while most of the others are very much smaller, some being less than twenty miles in diameter. The known ones now number many hundreds, and fresh discoveries are frequently announced. Ceres, the first and largest, was discovered January 1, 1801, and within three years three others, which were named Pallas, Juno and Vesta, were seen.

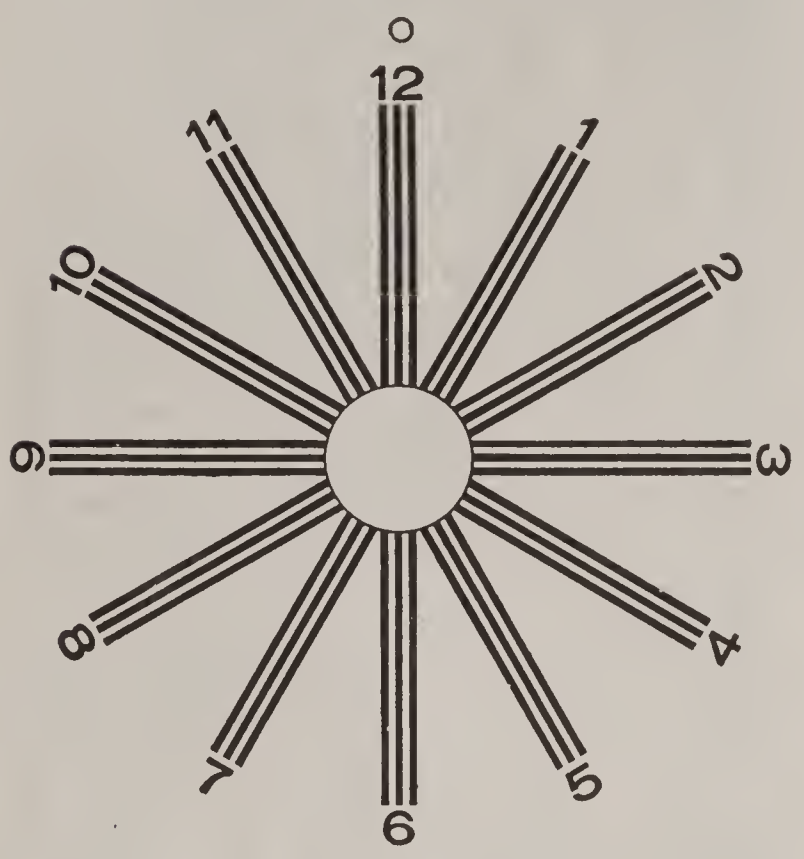
The extraordinary smallness of these bodies and their nearness to one another gave rise to the erroneous opinion that they are but the fragments of a planet that had formerly existed and had been brought to an end by some catastrophe. For nearly forty years investigations were carried on, but no more planets were discovered till December 8, 1845, when a fifth planetoid (Astraea) was found in the same region. The asteroids are now considered to be parts of a ring, similar to the rings of Saturn, broken into minute portions by the attraction or disturbance caused by Jupiter. Eros, one of the smallest, discovered in 1898, approaches the earth more nearly than any other body except the moon. The mean distances of the asteroids from the sun vary between 135,000,000 and 300,000,000 miles, though there may yet be undiscovered ones at far greater distance. The periods of revolution vary between 643 days for Ceres and more than 3,000 days for the most remote. Their total mass does not exceed one-fourth that of the earth. For location, see charts in article ASTRONOMY.

ASTHMA, *az'mah,* a distressing malady connected with the process of breathing. The characteristic symptoms of an attack of asthma are difficult breathing, wheezing, coughing and, in extreme cases, slight asphyxia. Asthma is thought to be due to spasm of the minute muscles in the walls of the bronchi. It very often is an accompaniment of hay fever, and attacks may be brought on by inhalation of pollen, as in the latter disease. Some victims are affected by particular odors, and suffer a paroxysm when brought in contact with one of them. Attacks usually begin suddenly, with a preliminary feeling of oppression. They are liable to be worse at night, and are especially bad in a damp, close atmosphere. Storms are often responsible for attacks. The paroxysms recur at irregular intervals and generally pass away in a few hours, though the duration is subject to considerable variation. The patient, in his efforts to obtain air, may grow purple in the face, and his eyes may become bloodshot.

Men seem to be subject to asthma oftener than women, and a highly-nervous temperament predisposes one to the disease. Children often become asthmatic after attacks of measles, bronchitis and whooping cough. Change of climate has been known to arrest the disease, which tends to become chronic after a long period of recurring attacks. Drugs are usually of little avail, the best treatment

being along lines of hygiene and dieting. In some cases, where the attack is of long duration, hypodermic injections inducing sleep have to be administered to save the patient from complete exhaustion. W.A.E.

ASTIGMATISM, *as tig' ma tiz'm,* a form of imperfect refraction of the eye, in which parallel rays of light are refracted or bent unequally in the different planes or meridians. This inequality of refraction is due, in the



A PRACTICAL TEST

In the above chart, if all the lines do not appear equally black to the natural eye, astigmatism is likely to be present, in greater or less degree.

majority of instances, to the fact that the curvature of the cornea (sometimes the lens, also) is abnormal. In the normal eye the curvature of the cornea is equal in every meridian or plane; in the astigmatic eye these curves vary like the curvature of a spoon, in which the curve from tip to point is long and less acute, while the curve from side to side is short and sharp. Rays of light passing through a cornea of the spoon-shaped variety would be bent or refracted unequally, and such a condition would be known as astigmatism.

Astigmatism either exists from birth (congenital) or is acquired through disease, principally of the cornea of the eye. The vast majority of persons have astigmatism in greater or less degree, and it is the most common cause of "eye strain" and many other distressing complaints such as headaches, stomach trouble and numerous "nervous symptoms." Properly-fitted glasses, combined with sensible regulation of ocular hygiene and attention to the general health, almost always relieve such distressing symptoms.

A much used test for astigmatism is the "clock dial chart" which is similar in appearance to a clock dial, with a number of dark lines radiating from the center to the different hours, as from twelve to six o'clock, three to nine, ten to four and two to eight o'clock, etc. In the normal eye all the lines on this chart should appear equally distinct and of the same degree of blackness. In the astigmatic eye certain lines may appear more distinct or blacker than those radiating at right angles to them. For example, the lines running from twelve to six may be more distinct or blacker than those running from three to nine o'clock. This test, while suggestive, is not strictly reliable, and other more scientific and technical tests made by oculists are necessary to determine with accuracy the presence and degree of astigmatism. See EYE. R.J.T.

ASTOR FAMILY, a family of American capitalists, frequently called the "landlords of New York City," because the founder of the family invested most of his fortune in real estate, and its gradual rise in value has placed his descendants among the richest persons in the United States. They are America's nearest approach to the typical European hereditary, land-owning families. Though the family fortune was founded in a commercial enterprise, it was soon tied up in real estate, and each succeeding generation has added to rather than sold the land held by the family.

John Jacob Astor (1763-1848), was born in the small village of Waldorf, near Heidelberg, Germany, where his father was a butcher. The son emigrated to New York in 1783, and almost immediately began to trade in furs, even preparing them for market with his own hands. So shrewd and industrious was he that in six years he had acquired a fortune of nearly $200,000. His business gradually expanded, and in 1811 he founded Astoria, Oregon, as a permanent station for regular trading with the

JOHN JACOB ASTOR
The founder of the great American house of Astor and of the fortune of the family.

Indians. In spite of the War of 1812 he prospered, and at his death had commercial connections in every part of the globe. Most of his fortune of $30,000,000 he invested in real estate in New York, much to the scorn of his friends, who thought him crazy because he bought farms outside the limits of the city. But the land which he bought by the acre in the vicinity of Broadway and 42nd Street is now sold and leased by the square foot, and a square foot is worth several times the price he paid for an acre. He bequeathed $350,000 to the city for a public library, known as the Astor Library.

William Backhouse Astor (1792-1875), son of the first John Jacob, inherited most of the estate, and by judicious management doubled its value. He contributed large sums to the Astor Library, founded by his father, and also bequeathed to it $250,000 in money and $200,000 worth of books. His two sons were John Jacob (1822-1890) and William (1830-1892), who divided his estate in equal shares.

John Jacob Astor (1822-1890), third of this name, was the eldest son of William Backhouse Astor. He was educated at Columbia, Gottingen, and Harvard universities, taking the course in law at the last institution to qualify himself for the management of the Astor estate. Like his father and his grandfather, he gave liberally to the Astor Library and to many charities. He was a colonel on McClellan's staff in the War of Secession, and was far prouder of his military record than of any other achievement in his life.

William Waldorf Astor, Baron (1848-1919), son of the preceding, was the first of the Astors to abandon the United States as his home; he removed to London in 1890 and in 1899 became a British subject. He served in the New York assembly for two terms, and from 1882 to 1885 was United States minister to Italy. On the death of his father he became head of the family and the possessor of an estate estimated at $200,000,000. In England he became the owner of the *Pall Mall Gazette,* one of the leading Conservative newspapers. In 1916 he was created a baron by King George V.

John Jacob Astor (1864-1912), fifth child of William Astor and grandson of William B. Astor, was one of the ablest members of this remarkable family. After graduation from Harvard in 1888, he traveled extensively, and then devoted most of his time to the management of the estate. He owned many notable buildings in New York, including the Saint Regis, the Knickerbocker and the Waldorf-Astoria hotels, all built on lands purchased by his far-seeing great-grandfather. He was known as the inventor of numerous mechanical devices, including a bicycle brake, a machine for developing peat deposits and an improved form of turbine engine for ships. In 1898 at his own expense he equipped a battery for service in the Philippines, and he himself served on General Shafter's staff in Cuba. He took part in the battle of Santiago and was chosen by Shafter to deliver the official notice of Spanish surrender to the Secretary of War. He lost his life by the sinking of the steamship *Titanic,* April 15, 1912; his wife of a few months was among the few rescued, and a short time later a son was born, who perpetuates the name of the founder of the line. His vast estate was left in trust, his son, WILLIAM VINCENT ASTOR (born 1891), being the principal heir. W.F.Z.

ASTORIA, *as toh' ri a,* OREGON, county seat of Clatsop County, the location of the largest salmon fishing and canning industries of the world. It is a port of entry and shipping center in the extreme northwestern corner of the state, on the south bank of the Columbia River, nine miles from the Pacific Ocean and 101 miles northwest of Portland. It is on the Spokane, Portland & Seattle railroad and has several steamship lines operating to domestic and foreign ports. In 1910 the population was 9,599; in 1920 it had increased to 14,027. The area of the city is nearly five square miles.

Astoria is situated in a region of marine scenery of striking beauty. In 1916 the city was in the midst of a reconstruction period; the five miles of water front within the city limits were being enlarged to constitute one of the largest and most complete municipal docks on the Pacific coast. A sea wall was in course of construction and the grade of streets was being raised. The annual product of the salmon canneries, mentioned above, is approximately $5,000,000; over 3,500 men are employed in this industry. Lumbering in the dense pine forests of the adjacent country and the sawmills give employment to nearly 5,000 men, not all of whom, however, live in the city. The city has an extensive export trade in lumber, wheat, oats, live stock, wool, potatoes and apples.

Astoria, named for John Jacob Astor (see ASTOR), was founded in 1811 by his employes, and was the first settlement of white men in

the valley of the Columbia River. Fort Clatsop had been built there in 1805 by the Lewis and Clark Expedition. The place was to be a central depot in a system of fur-trading posts extending from the Great Lakes westward. In 1813 it was seized by the English, who renamed it Fort George. In 1818 it again came into possession of the United States, though it was occupied by the Northwest Company, English fur traders, until 1845. It was incorporated as a city in 1876. C. OF C.

ASTRAKHAN, *as' tra kan,* the name given to the fur or wool of a particular variety of lamb bred in Southern Russia, Persia and Afghanistan, deriving its name from the town of Astrakhan in Russia. Its curly, glossy fur is in great demand for collars, cuffs, muffs and other ornaments for winter garments. The wool is of finer texture, more silky and is more durable than that of any other variety of lamb. Its superior qualities are attributed to the action of the climate, as animals of the same breed, exported to other countries, produce inferior wool. The skins of the lambs are sold in open market for sums varying from 25 cents to $1.50, but when dyed and ready for wear they are very expensive, a good astrakhan collar costing from $12.50 upwards.

The name *astrakhan* is also applied to a cloth made in imitation of the fur.

ASTRAKHAN, an important port and manufacturing center of Southeastern Russia, capital of the province of the same name. It is situated on the delta of the Volga River, about forty miles from the Caspian Sea. Fish, caviare, isinglass, leather, furs, astrakhan, silk and cotton are extensively exported. Important commerce is carried on with all Caspian ports and with inland towns by means of the great waterway of the Volga. The town is on low-lying land and has only a few good buildings, the streets being, for the most part, narrow and dirty. Population, 1919, 147,052.

ASTRINGENT, *as trin' jent,* from words meaning *to bind* or *to contract,* refers to a medicine which contracts the organic textures and canals of the body, thereby checking or diminishing excessive discharges. There are two classes of astringents used by physicians, namely, vegetable and mineral. The vegetable astringents all contain tannic and gallic acids, catechu, kino, oak-bark and rhatany. Mineral astringents include mineral acids, zinc, iron, lead, silver, nitric and hydrochloric acids, alum, lime-water and chalk.

ASTROLOGY is the predecessor of astronomy in that its pursuit required the accumulation of a considerable range of astronomical data; this aspect was known as *natural* astrology. But the motive that supported the inquiry was that of predicting and controlling human fate; this phase was known as *judicial* astrology. The two interests were more detached than was true of the (later) relations of alchemy and chemistry. The superstitions of astrology (see SUPERSTITION) were comprehensive and inherent in the underlying ideas of the system. Assyria, Arabia, Greece, Rome and Western Europe practiced and continued the astrological lore. Its practice included the determination of fortunate days for various enterprises (see DIVINATION); fixing the site of temples; prophesying the issue of events; prescribing medicines according to astrological affinities; diagnosing disease by means of the relations of the several parts of the body (or the vital system) to the positions of the planets; and most prominently, the casting of horoscopes.

All these practices were determined by the zodiac, which was the name given to that part of the heavens containing the paths of the sun, moon, and principal planets. It was divided into twelve portions by reference to the constellations in the several divisions. Thus, the Ram (Aries) leads ("the first house") and is the sign under which the child is born. The sign of Jupiter (see ZODIAC) is the astrological origin of the ℞ which still heads the physician's prescriptions. It should be observed how naturally the several "occult" sciences worked together; the course of events, the treatment of disease, the guidance of the affairs of life were regulated by notions which were at once alchemistic and astrological.

The underlying conception of astrology is that the courses and appearances of the heavenly bodies exert a "moral" or prophetic influence upon the earth and its inhabitants. Divination and prediction were its chief functions. For this purpose an elaborate system was devised; for the data were limited to the relations of position of sun (moon), planets and constellations. To bring these into relation to human fate, each of the four ages of man—childhood, youth, adult life and old age—were assigned three divisions (houses) in the zodiac, by giving each an ascendant, a dominant and a declining "house". By distributing the several human virtues of qualities or fates, such as content, cowardice, valor, justice, riches, disease, injury, accident, war,

business venture, office, death, over the planets and constellations (Jupiter for the jovial, Venus for love-affairs, Mars for war, Mercury for business, Leo for courage, Libra for justice, etc.,) it was easy to lay out the course of a life's career by means of a horoscope.

The twelve signs of the zodiac were assigned to different portions of the body: Aries (ram) for the head; Taurus (bull) for the neck and the shoulders; the Twins (Hercules and Apollo) for the arms and hands; Pisces (fish) for the feet; specific diseases were thus predicted and cures prescribed. (The fanciful analogy is readily observed: the ram has a conspicuous head, the bull a strong neck, etc.) The system left room for adjustments in interpretation toward the pleasant fates, especially in casting the horoscopes of kings or nobles—and while occasional successes were heralded, failures or vague issues were naturally ignored. The interest in astrology is centered in the early religious type of conception out of which it grew; as a system of divination, it follows the usual elastic adjustment of sign to fate. It developed such fantastic predictions as that of the end of the earth in 1524 by a flood, because three planets would then meet in the aqueous sign of Pisces; or that if at the time of a theft the "lord of the sixth house" (i.e., the constellation conspicuous in the sixth division of the zodiac) is in the second house, the thief is a member of the family. Astrology rapidly degenerated to fortune-telling and pretense. Its motive was quite unrelated to that which made astronomy possible.

Astrological notions are treated so fully in these volumes under SUPERSTITION and DIVINATION that this account is limited to the essential features of the system. It is interesting to note how many words—such as *disastrous* (evil-starred)—have astrological origin. J.J.

Relating to Various Beliefs. The articles on the following topics, while not bearing on astrology, are of interest in this connection because they, too, deal with pseudo-sciences or superstitions:

Alchemy
Clairvoyance
Conjuring
Demonology
Divination
Faith-Cure
Hypnotism
Magic
Medium
Mesmerism
Mind Reading
Necromancy
Occult
Palmistry
Phrenology
Physiognomy
Psychical Research
Psycho-Analysis
Spiritualism
Subconscious
Suggestion
Superstition
Telepathy
Theosophy
Trance
Witchcraft

ASTRONOMY. Who that has watched the heavens on a calm, clear night, when the canopy of blue seems so thickly gemmed with stars that room could not be found for more, can wonder that the shepherd races of the East were thoughtful men? Guarding their flocks by night in those cloudless lands they must all have felt with David, the shepherd king—

"When I consider the heavens, the work of thy fingers,
The moon and the stars which thou hast ordained,
What is man, that thou art mindful of him?

Long before David's time, even before Abraham came out of Chaldea 4,000 years ago, the wise men of that nation had made the study of the stars a serious business, and had in a sense laid the foundations of the modern science of astronomy. In the same age, far away in the same continent, the Chinese were also observing the heavens, and at a time not much later the Egyptians and Greeks became skilful astronomers.

In those days all men believed as many did in Shakespeare's time that—

"It is the stars,
The stars above us, govern our conditions,"

and their studies took the form of *astrology* more than of astronomy; that is, they cared more for divining the supposed influence of the stars on individual destinies than for acquiring an understanding of their true nature and relation to the universe (see DIVINATION).

But they early discovered the fact that five of the stars were not fixed in the sky as the others seemed to be, but moved in paths like the moon's. These five the Greeks called *planets,* a word which means *wanderers.* The Chaldeans are said, too, to have been able to predict eclipses with accuracy, and to have known that the rotation of the four seasons occupied 365¼ days.

Ptolemy, an Egyptian of the second century A. D., outlined the mechanism of the universe as he believed it to be, and the world accepted his views almost as late as our own time. Ptolemy's earth was an immovable globe in the center of the universe; around it revolved a huge hollow sphere in whose walls were set the stars, and inside of which, at different distances, traveled the sun, the moon and the five planets then known, Mercury, Venus, Mars, Jupiter and Saturn. As we watch the Great Dipper slowly turn about the North Star it is easy to understand how Ptolemy thought as he did, though we know now that it is the spinning of the earth on its axis that causes this effect.

Early in the sixteenth century Copernicus, a Pole, learned that the doctrines of Ptolemy were almost entirely wrong, for the sun is the center about which the earth and the planets revolve. But, as in the time of Pythagoras, who had come to the same conclusion a little more than 2,000 years earlier, people were not ready to believe such teachings, and Copernicus was excommunicated by the Pope. Within the next two centuries lived four great astronomers, Tycho Brahe, Galileo, Kepler and Newton, who made many valuable observations and discovered several of the fundamental laws, the most vital of which is the one known as Newton's Law of Gravitation (see NEWTON, ISAAC).

What the Heavens Contain. Because of the faithful work of these men and those who have followed them, astronomers now know to a surprising extent how the material universe is arranged. We no longer think, with Milton, that the Creator—

> "made the stars,
> And set them in the firmament of heav'n,
> T' illuminate the earth,"

for we know that our own world is a very, very small part of the universe which we can see, and that beyond the reach of our eyes in every direction there must be worlds upon worlds and suns upon suns, to a truly infinite extent.

The earth is a planet like the five which the ancients knew, like Uranus and Neptune, discovered in modern times, and like the numberless little earths called *asteroids* or *planetoids,* many of which are yet undiscovered. All the planets travel around the sun, whirling on their axes as they go. Together with their moons, or satellites, they make up our solar system. Mercury, the innermost planet, has a year only as long as three of our months, while Neptune, the farthest out, passes around the sun only once in 164.78 of our years. Each satellite revolves about its planet much as the earth does about the sun, but several of them circle in the opposite direction, and the satellite of Uranus moves from south to north. Saturn is known to have ten moons and Jupiter nine, one of which takes two years and two months to complete each journey. One of the moons of Mars is only ten miles in diameter, the other thirty-six.

HOW THE CAMERA DISCOVERS PLANETOIDS

If a portion of the heavens is photographed, the telescope being moved by clockwork to keep pace with the fixed stars, a planet will show as a streak. In this way hundreds of tiny worlds have been found.

But the sun is not, as even Copernicus thought, the center of all creation. It, too, spins on its axis, once in twenty-five days, and is carrying the solar system through space at a rate of about sixteen miles a second, not quite as fast as the earth moves in its annual journey. This we know because the stars in one direction are gradually spreading apart (just as the two sides of a road open in front of you as you speed along in an automobile), while in the opposite direction they are moving together. Possibly our sun is revolving about some other—what one we do not know.

All of the stars we see, the planets alone excepted, are suns, some of them thousands of times as big as our sun, which is itself 860,000 miles in diameter. Many of them, perhaps all, have companions, some bright suns, others dark globes which we cannot see, with which they spin about as though they were two stones chained together. The period of revolution has in some cases been determined, and in others it can be estimated with

considerable accuracy. The great star known as Castor has a companion with which it completes a revolution once in about a thousand years; the two are of course immense distances apart, yet to our naked eyes they seem as one star. No doubt numbers of the *binary systems,* as these doubles are called, require an even longer period to turn about. Many of the stars have motions which are not yet well understood, though it is noticed that some of them seem to travel in companies.

Besides the sun, the moon, the planets and the stars there are three types of heavenly bodies. The first type, including *meteors* and *meteorites,* or falling stars, most of us have seen. They make such a bright trail through the skies that it is hard for some people to believe that they are really very small, sometimes only grains of dust. Meteors move

EVEN THE "FIXED STARS" MOVE

(*a*) The "big dipper" and the direction in which its stars are moving.
(*b*) As the "dipper" will appear in about 100,000 years.

about the sun in streams, one of which is now and then crossed by the earth, causing myriads of the tiny bodies to be attracted by it. When they reach our atmosphere, perhaps 100 miles above us, they are heated to a temperature of thousands of degrees, and only then do they become visible. *Comets* are not so frequently seen as meteors. They are gaseous masses, with long, feathery tails which always point away from the sun. Some of them journey about through space, coming within sight of our earth, then passing on to far-off regions, never again to be seen. Other comets have been captured by our sun, and confine their travels to our own solar system, reappearing at regular intervals. Halley's comet, the best known of them, visits our skies every seventy-five years; its last appearance was in 1909. (See Comet.) *Nebulae,* unlike either meteors or comets, do not come near our corner of the universe. They are spiral clouds of gas, some white, some green, and are probably suns in the making. There are thousands of nebulae known, most of them in those parts of the sky where the stars are least in number. The largest nebula known may be seen with the naked eye; it is at the central star in the sword handle of the constellation Orion, described below.

Distances That Defy the Imagination. Suppose you were to attempt to construct a diagram of the position of the earth and the sun, moon and stars in such a way as to show their distances from one another and their relative sizes. If you represented the earth's diameter of 8,000 miles by a small pin hole, how large a sheet of paper would you need for your diagram?

First of all you would mark the moon, a mere pin prick, five-eighths of an inch from the earth. The sun, you would represent by a circle over two inches in diameter, placed more than nineteen feet from the pinhole! You have already exceeded the limits of a sheet of paper, yet you have only started your diagram.

If you moved out-of-doors to get more room for your work, you would continue by placing Mercury seven and one-half feet and Venus fourteen feet from the sun; both these planets are smaller than the earth. Then would come Jupiter, one hundred feet from the sun, but only three-sixteenths of an inch in diameter. One hundred eighty feet away from the sun would be Saturn, not as large as Jupiter; a little more than twice as far would come Uranus, an eighth of an inch wide; nearly 700 feet from your starting point would be Neptune, only a little larger than Uranus.

Consider for a moment that the little pinhole indicates the earth, which seems quite a large place if we travel about it, yet in a space of 700 feet, representing nearly three thousands of millions of miles, you have marked only nine globes, most of them too small to be seen. To these could only be added the moons of other planets, and the tiny asteroids. This gives you some idea of the immensity of space, and yet you have only dealt with a half dozen of the many, many stars that are seen in the heavens.

Beyond the planets the nearest star to our sun is one which may not be seen north of Cuba; after Neptune it is the closest heavenly body which any one on earth can see. Neptune was marked by 700 feet on your chart; this star, called Alpha Centauris, will be 100 miles away from the pinhole earth! Its true distance is about twenty-five millions of millions of miles. At this enormous distance you are just beginning to peep into space. Sirius, the brightest star in the sky, is twice as far as Alpha Centauris; the north star is prob-

ably a little more than ten times its distance; Canopus, second in brightness, is perhaps eighty times as deep in space. Most of the stars are still farther away, and some that you see are separated from us by perhaps 1,000 times the distance of Alpha Centauris; that is, on your chart in which the pinhole represents the earth's 8,000 miles, they would be 100,000 miles from it. Beyond this, stretching how far no one can guess, are countless stars which we cannot see even with the strongest telescopes.

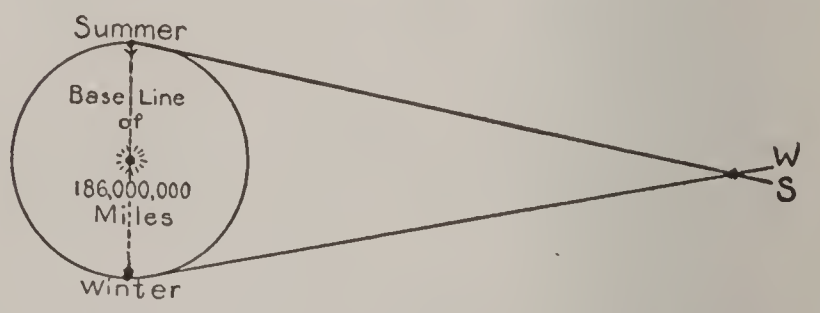
It is not easy to talk in terms of billions, trillions and quadrillions of miles, so astronomers measure their distances in *light years.* We know that light travels so fast that in one second a ray of it could pass around the earth about seven and a half times, or more times than you can move your finger around the end of a pencil in a second. Light takes a little more than a second to reach us from the moon, eight minutes from the sun, and over four hours from Neptune. But the rays from the nearest star travel four years and five months, so it is said to be at a distance of 4.4 light years. The rays which show you the location of the north star started on their way about forty-four years ago, and some of the stars you seem to see may have ceased to exist several thousand years ago, but the rays which they gave out are still active and are just reaching the earth.

How Astronomers Work. The most striking thing about all this is not that there are such great distances and so many suns and worlds, but that man has been able to learn so much about them. There are two kinds of astronomers, the observers and the mathematicians, and it is said to be seldom that one man combines in himself both characters. Sometimes it is the mathematicians who make discoveries, sometimes the observers.

This is well illustrated in the romantic story of the discovery of the planet Neptune. According to Newton's law of gravity, "Every particle of matter in the universe attracts every other particle, with a force in the direction of a straight line joining the two." Thus the path of each planet is influenced not by the sun only, but by each of the other planets and stars, as well. After Herschel's discovery of Uranus in 1781 astronomers set to work to map its course. They soon found that it did not travel in the path or at the speed which the location and size of the other planets and the sun would dictate, though the variation was so slight that it might easily have been due to errors in calculation.

In 1821 a French astronomer suggested that an unknown planet was influencing Uranus, and in 1843 a young mathematician at Cambridge University, England, commenced to work on the problem. Two years later he had finished his calculations showing where the unknown planet must be; these he took to the Astronomer Royal, who laid them aside and forgot about them. The next year a young Frenchman sent a similar set of calculations to the Director of the Berlin Observatory; the very night of their receipt an observer commenced a search for the new planet and found a small star which did not appear in his maps. This later proved to be the new planet, which was named Neptune. In the meantime the English Astronomer Royal had heard of the work which the Frenchman claimed to have done; he got out the papers which for a year he had neglected, and, following the directions contained in them, an English observer discovered the planet just a week after his Berlin colleague. So it was that the great Neptune was actually found by two mathematicians who themselves had no apparatus to observe the stars.

Three instruments have meant more to the progress of astronomy than all others. The first is the *telescope,* which Galileo introduced to the field of astronomy; the others are the *camera* and the *spectroscope,* made helpers in the nineteenth century. What the spectroscope does for astronomers in the way of measuring distances and velocities of stars is told in the article on that subject. Sometimes all three instruments are combined into one, known as a *spectrograph.*



HOW DISTANCES MAY BE DETERMINED

In summer the earth is 186,000,000 miles from its winter position. By observing a star from both positions astronomers learn the angle *WS* and by trigonometry figure its distance. But inasmuch as the nearest star is more than 140,000 times 186,000,000 miles away, there are very few stars whose distance may be found exactly, even with this enormous base line.

When a photograph is to be made through a telescope the sensitive plate is simply inserted in the place where the astronomer's eye would

otherwise be. No other lens is needed than that of the telescope. But there are other difficulties. The movement of the stars about the North Star, caused by the rotation of the earth, is of course magnified in the telescope, and to prevent a photograph from becoming blurred it is necessary to attach clockwork which will keep the telescope pointed in the proper direction. For very delicate work even this machinery is not sufficient. Many photographs require several hours exposure, and all this time an observer must sit with his eye to a parallel telescope, making whatever minute adjustments are necessary. At the end of his instrument is a cross made of spider's web, which is much finer and smoother than hair; at the start some bright star is focused exactly at the center of the cross, and if it appears at any time to move the slightest distance in any direction the observer brings it back by an adjustment.

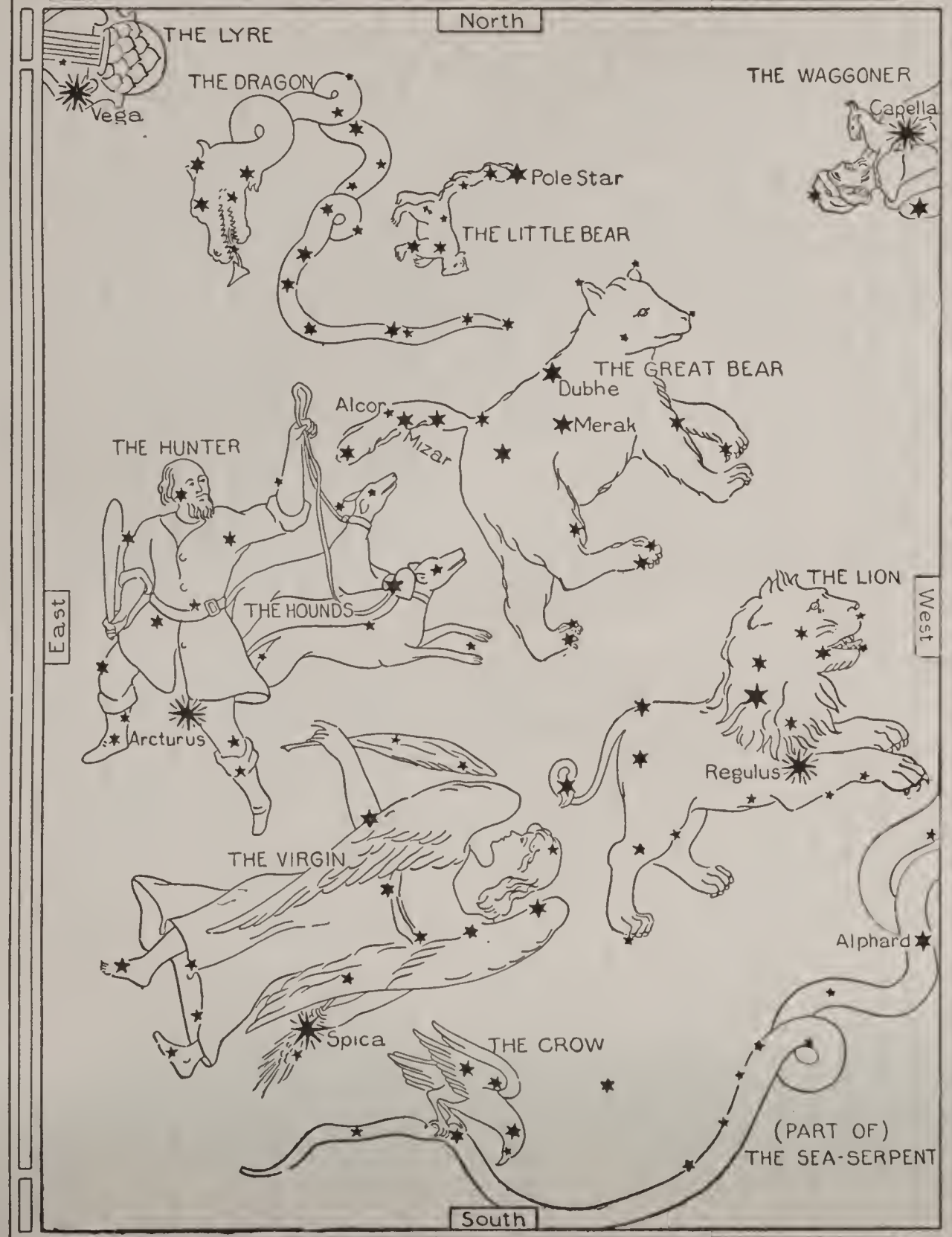
The tasks assumed by modern astronomers are various. Some devote themselves to special researches on the sun, the moon or one of the planets. Others are mapping specified sections of the heavens, to facilitate the discovery of new stars. Many more are busy with the distant stars or the nebulae, determining their velocity, their distance or their composition. Often what appears to the unaided eye to be a single star is shown by the telescope to be two or more, sometimes one behind the other and having no mutual connection, at other times forming a binary system. Again, what appear through even the most powerful telescopes to be single stars are proved by the spectroscope to be members of binary systems. Much of the study of nebulae and of dark stars, of which one astronomer estimates there are four for every bright one, is part of the attempt to discover the origin of worlds, including our own. It takes so many ages for a world to be formed that of course no series of observations can be made of any one case, but by comparing stars of all sorts, from "babies" to "old men," astronomers will no doubt in time reach correct conclusions.

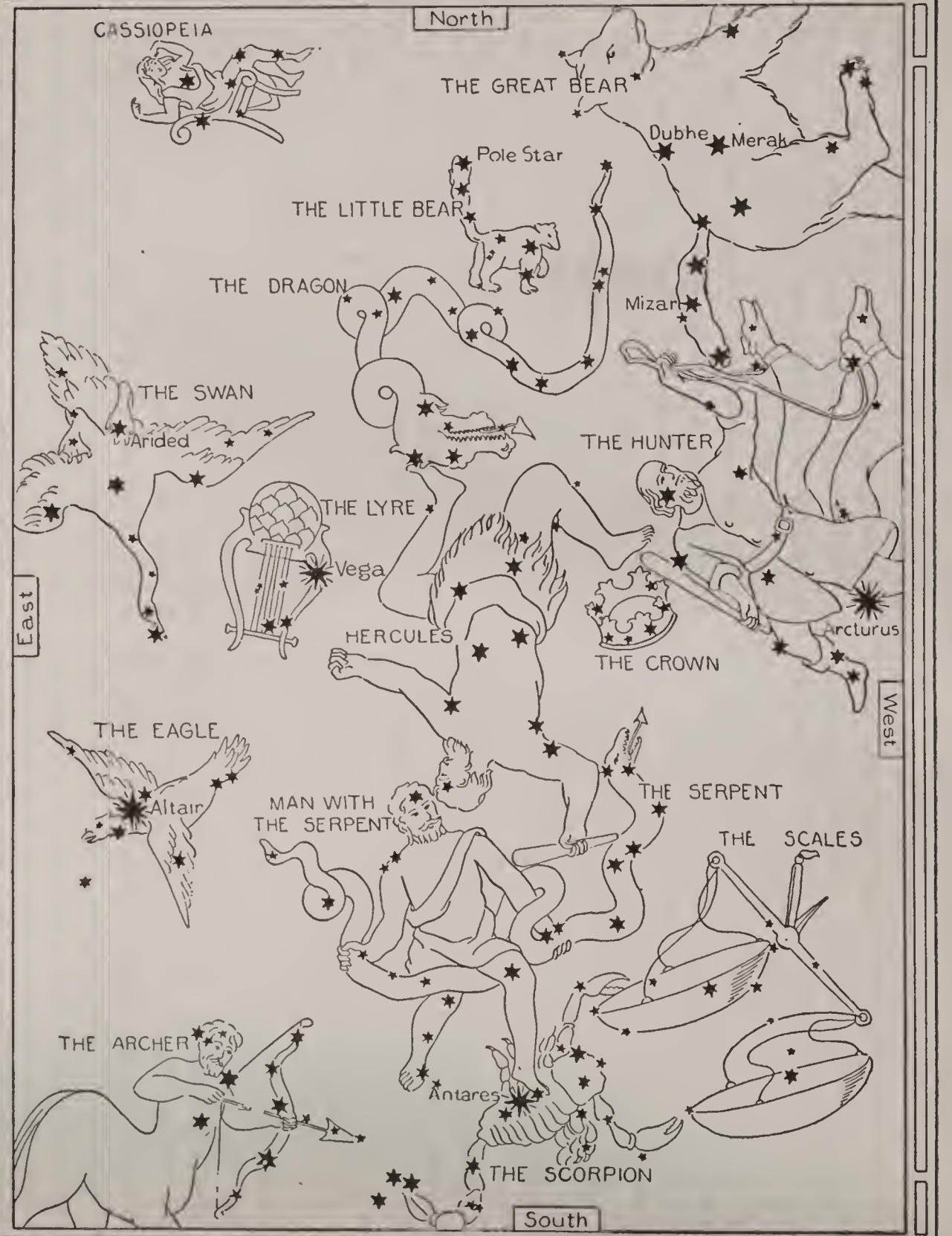
The Stars and Their Names. To gain the greatest pleasure from the stars we should make them our friends. We cannot hope to know them all, for there are many millions, but we can easily learn to recognize many. If the stars were arranged in regular order like those on many national flags it would be quite a task to distinguish them, but fortunately they are not. Instead, they form many irregular groups, which we call *constellations.* From very early days men have given names to the constellations, mostly because of some real or fancied resemblance to animals or to characters in mythology.

The best way to become acquainted with the constellations and their principal stars is to compare them with the double-page maps accompanying this article, which show the best known figures in the heavens of the northern hemisphere at each of the four seasons, between eight and nine in the evening. In using one of the maps, hold it over your head, so that east, west, north and south will be in their proper positions.

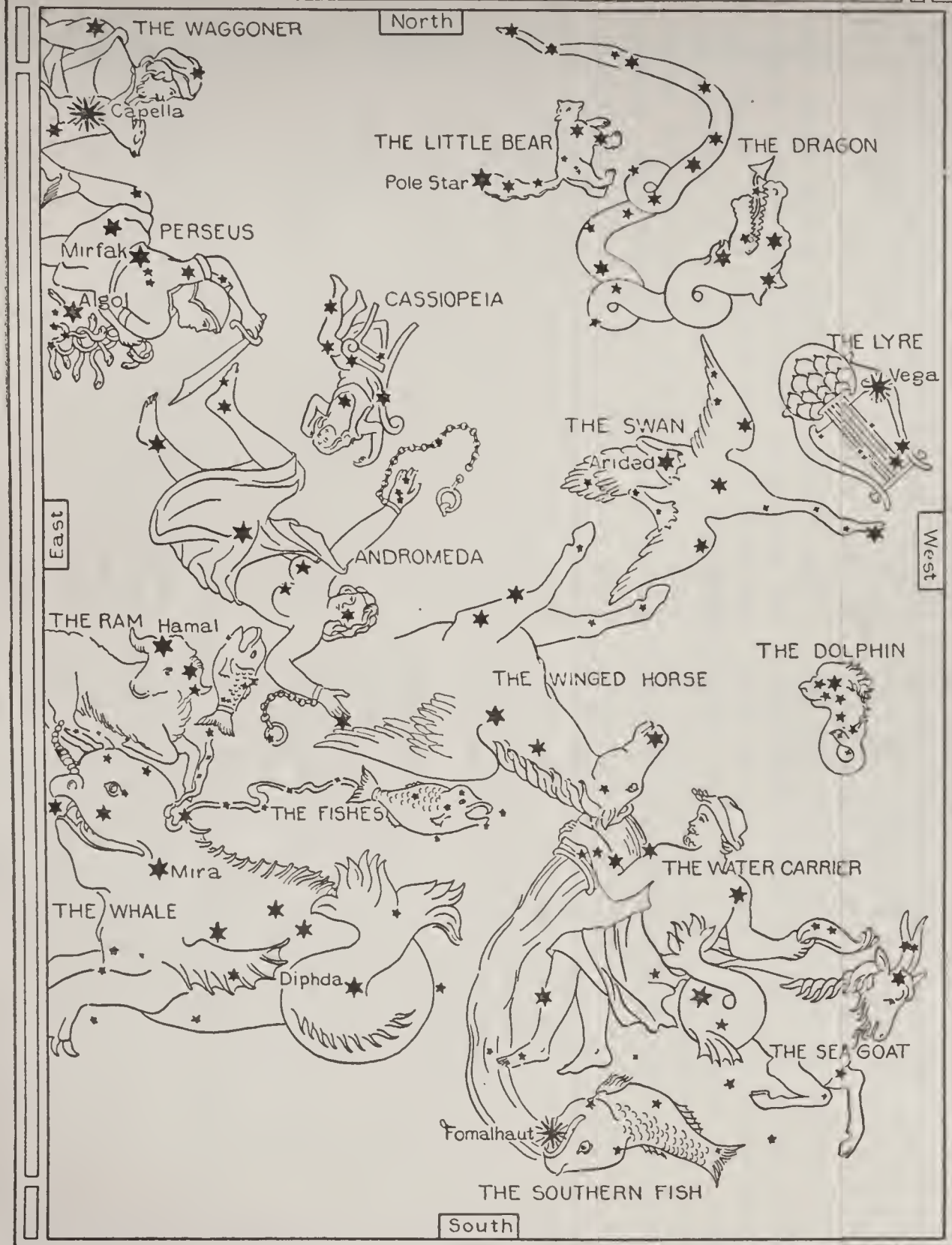
The Heavens in Spring. Suppose you are looking at the heavens in spring. A little to the north of the zenith (the point directly over your head) is one group of stars which nearly everyone knows—the Big Dipper. On the map it forms the tail and part of the body of the Great Bear. From the Dipper it is always easy to find the North Star, or Pole Star, for it is almost directly in line with the stars Dubhe and Merak, which form the front of the bowl. The Pole Star is the tip of the Little Bear's tail, or as others have it, the end of the handle of the Little Dipper. East of the Little Dipper is Draco, the Dragon, whose head is marked by four stars, and whose tail winds around nearly to the Big Dipper. The star between Mizar of the Big Dipper and the outer star of the bowl of the Little Dipper was our North Star 4,000 years ago, but the constant change of the angle of the earth's inclination to the plane of the ecliptic (see Ecliptic; Precession of the Equinoxes) has brought the earth's axis gradually to its present position. After 12,000 years the polar star will be Vega, the bright star northeast of the Dragon's head.

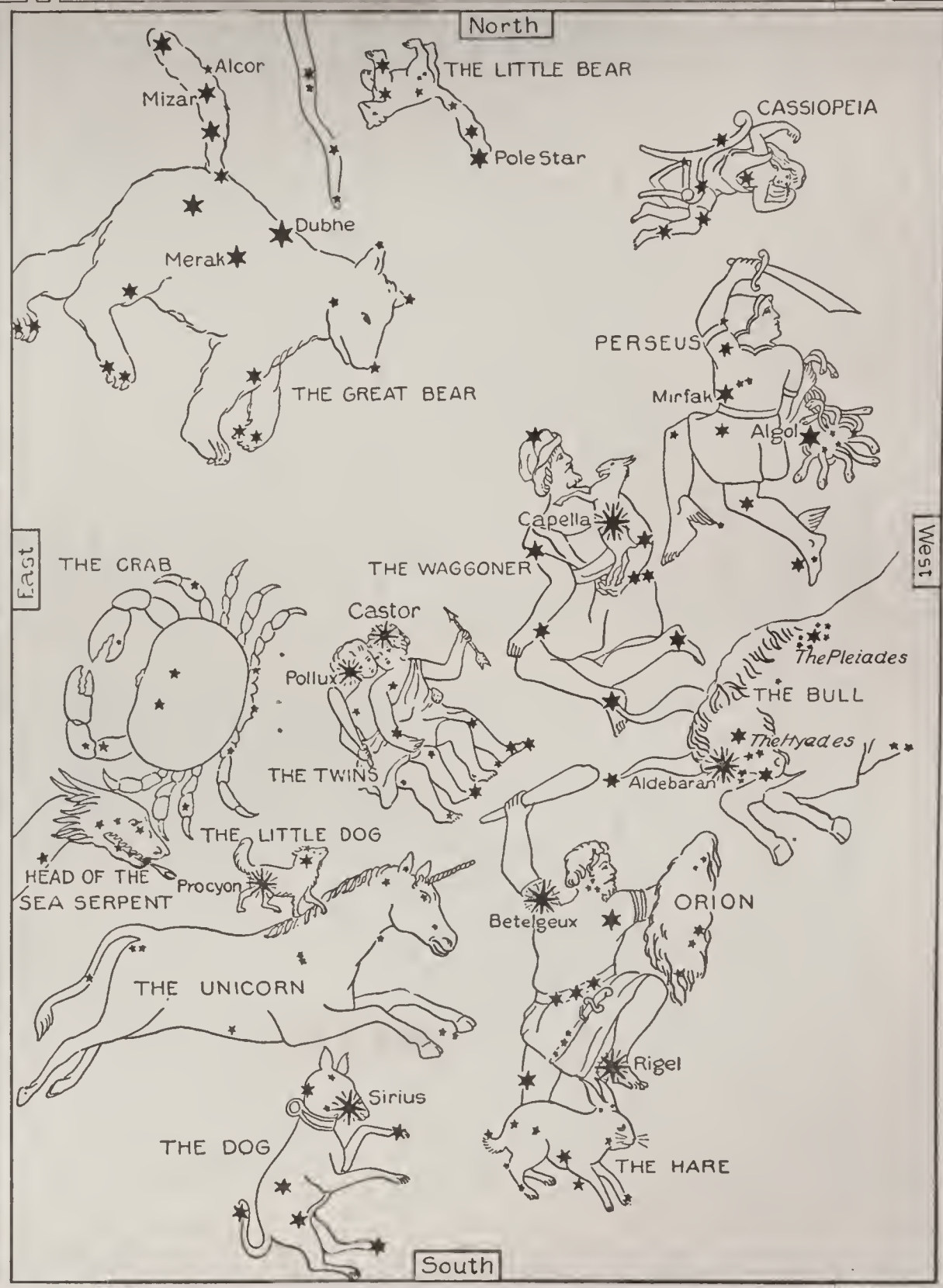
Vega, it will be noticed, is much brighter than the stars about it. It is called a *first magnitude star,* for astronomers have a way of classifying stars according to the amount of light they give out. There are but twenty of the first magnitude, and only three of them—Sirius, Canopus and Alpha Centauris—are brighter than Vega. Next to Vega in brightness is Capella, west of the Pole Star, and the next again is Arcturus, which may be found by extending the curve on the Big Dipper's handle towards the east and south. Arcturus is one of the largest known suns; its diameter is many millions of miles. Two other first magnitude stars will be found in the heavens at this time, Spica in the constellation of the





THE HEAVENS IN SPRING AND SUMMER





THE HEAVENS IN AUTUMN AND WINTER

Virgin, and Regulus, at the end of the handle of the Sickle, in the Lion.

The Heavens in Summer. In the second of the maps will be noticed several new constellations. In spring they could have been seen only after midnight. Cassiopeia, in the northeast, is easily recognized by its resemblance to the letter *M*. Scorpio, the Scorpion, in the south, is another constellation not difficult to find. Its brightest star, Antares, is red in color. Near the eastern horizon is Altair, a star which gives ten times as much light as our sun. It is only fifteen light years away from us, and is traveling in this direction about twenty-seven miles in one second, and after 100,000 years will occupy the same place in the universe that our solar system does now. But by that time we shall be millions of millions of miles away.

The Heavens in Autumn. At this time of the year the star of the south is Fomalhaut, which may be recognized as the first magnitude star at the end of the wavy line which represents the water flowing from the jar of Aquarius, the Water Carrier. The constellation Andromeda, toward the east, contains one of the two nebulae which may be seen without a telescope. This nebula is just north of the second magnitude star which marks Andromeda's waist; its length is supposed to be three million million (3,000,000,000,000) miles, and it is like a huge pinwheel in the skies. The star which marks the foot on which Andromeda stands is proved by the telescope to be three stars, one orange, one green, one blue. Algol, on the eastern horizon in Perseus, was known in olden times as the Demon, or the Winking Star. Ordinarily it is of the second magnitude, but for eighteen minutes on every third day it sinks one degree in magnitude. The wonderful spectroscope has proved to us that this variation is caused by a dark companion star which passes in front of it.

The Heavens in Winter. No other constellation contains so many bright stars as Orion, the Warrior, seen in the south in winter time. Two of them are of the first magnitude, Betelgeux, whose dull orange-red shows it to be a sun whose brilliancy is declining, and Rigel, seventh in brightness among all the stars. In the sword of Orion may be seen the nebula mentioned above. Sirius, the Dog Star, is by far the greatest light-giver of all in the heavens, and may be seen both north and south of the equator. Procyon, the Little Dog Star, is next to Rigel in brightness. Aldebaran, a rosy star which forms the flaming eye of the Bull, is one of those which is moving farther away from us. It is directly in the path of the moon, by which it is often hidden. Its companion star may be seen with a telescope. The Pleiades, at the back of the Bull's neck, are a group of tiny twinklers of which from six to eleven may be seen by the naked eye, though there are actually about 3,000. Photography shows them to be wrapped in a nebulous cloud, and they are thought to be closely related stars which are developing from it. In spite of their faintness many of them are a number of times brighter than our sun, and separated from each other by several light years. In ancient times the Pleiades were supposed to be Atlas, his seven daughters and their mother, and there is a legend of a lost Pleiad. Castor and Pollux, the Twins, are of interest because a few hundred years ago Castor was the more brilliant, but is now less bright than Pollux. This is because the latter is approaching us, the former moving away. Castor is a green star.

Conspicuous in the sky at all seasons is the broad luminous band known as the Milky Way or Galaxy. To us it seems but a softly-lighted cloud, but to the astronomer with a very powerful telescope it shows itself as a multitude of stars, so far away that it takes the light from them three thousand years to reach the sun. See MILKY WAY.

The Planets. Of those worlds which, like our own, move about our sun, Venus, Jupiter and Mars are most familiar to us. Venus was Hesperus, the evening star of the ancients, and Lucifer, the morning star as well, for people did not know the two were the same. Jupiter, whose moons give it an imperfect appearance, is nearly as bright as Venus, and Mars may be distinguished by its redness. All these "wanderers" appear at different times in different months, because their periods of revolution about the sun do not correspond to our own. Saturn is a bright, slightly red star. Uranus may seldom be seen without a telescope, and Neptune is never visible to the naked eye. Mercury is difficult to see because of its nearness to the sun.

C.H.H.

Consult Hawk's *Boy's Book of Astronomy;* Newcomb's *The Stars;* Martin's *Friendly Stars.*

Related Subjects. To the reader interested in astronomy the following list of articles on that subject contained in these volumes will be most helpful:

GENERAL

Apogee
Apsides
Ascension and Declination of Stars

OUTLINE AND QUESTIONS ON ASTRONOMY

Outline

I. Definition

II. How It Developed

(1) Among the Chaldeans
(2) Among the Chinese
(3) Among the Egyptians
(4) Among the Greeks
(5) Contributions of modern astronomers

III. How Discoveries Are Made

(1) By observers
(2) By mathematicians
  (a) Discovery of Neptune

IV. Astronomical Instruments

V. The Solar System

(1) The sun
  (a) Size
  (b) Distance from earth
  (c) Not center of universe
  (d) Composition
  (e) Movements
  (f) Importance
  (g) Gravitation
  (h) Satellites
    1. Earth
      a. Size
      b. Form
      c. Movements
      d. Atmosphere
      e. Satellite—the moon
    2. Other planets
      a. Number
      b. Location
      c. Movements
      d. Constitution
      e. Appearance
(2) Nebular Hypothesis

VI. Other Heavenly Bodies

(1) Stars
  (a) Number
  (b) Size
  (c) Distance from solar system
  (d) Constitution
  (e) Double stars
(2) Meteors
(3) Comets
(4) Nebulae

VII. Popular Phases

(1) The heavens in spring
  (a) Constellations
  (b) Bright stars
  (c) Planets
(2) The heavens in summer
(3) The heavens in autumn
(4) The heavens in winter

Questions

How old will you be when the rays of light which started from the North Star last night reach your eyes?

How long would it take the earth, at the rate it travels in its orbit about the sun, to reach Alpha Centauris?

Does the sun in its journey through space go faster or not so fast as the earth?

If the earth whirled about on its axis twice as fast as it does at present, what would be the result?

Show by means of a quarter and an electric light bulb how it is possible for the moon to cause an eclipse of the sun, which is so much larger.

How can it be possible that we see stars which no longer exist?

Why should spiders be kept in factories where astronomical instruments are made?

If you can see a star millions of miles away, why can you not see a meteor two hundred miles away?

How long would it take you in an airship going one hundred miles an hour to make the round trip to the moon?

What did Shakespeare mean when he made Cassius say

> The fault, dear Brutus, is not in our stars,
> But in ourselves, that we are underlings.

Outline and Questions on Astronomy—Continued

What legend accounts for the fact that Orion seems to be pursuing the Pleiades in the sky?

How long is a year on Mercury? A day?

Why are some comets seen at stated intervals, while others appear once and never again?

Draw a circle two inches in diameter to represent the earth. How large a circle will represent the moon? The sun? The planet Venus?

Could a blind man make astronomical discoveries?

Is the earth the only planet that has a moon?

If you were lost on the prairies on a starry night, how could you determine directions?

When Caesar said,

> But I am constant as the northern star,
> Of whose true-fix'd and resting quality
> There is no fellow in the firmament,

was he speaking accurately, or has the North Star changed since the beginning of time?

What star used to be called the Winking Star, and why?

Which of the planets are visible in the heavens, and when?

Who were the earliest astronomers?

What was their chief purpose in studying the stars?

What does the word *planet* mean?

To how many heavenly bodies is it applied?

What was the center of the universe according to Ptolemy's system?

Was Copernicus the earliest astronomer who figured out that the views of Ptolemy were not correct?

What heavenly bodies are a part of the solar system?

Are there any bodies conspicuous in the heavens which do not belong to this system?

Which planet is closest to the sun?

Which, as far as is known, is farthest away?

Which is the largest body in the solar system?

Is that same body the largest in the universe?

Which of the planets is known to have the most satellites?

Which are more frequently seen, comets or meteors?

Beyond the farthest planet, what is the nearest heavenly body which may be seen from the earth?

About how far away is the brightest star in the heavens?

What is meant by *light years?* Why do astronomers measure time by means of them?

What was there especially interesting about the discovery of the planet Neptune?

Name five astronomers and tell something which each contributed to the science.

Divide the "heavenly bodies" listed in the index into stars, planets and constellations.

What is meant by the "signs of the zodiac"? Name them.

Name and locate two great observatories.

What is meant by a "binary system"?

Pick out on the charts of the heavens four constellations which have names drawn from mythology and look up the myths in connection with them.

Asteroids
Aurora Borealis
Calendar
Comet
Conjunction
Constellation
Degree
Double Stars
Eclipse
Ecliptic
Fixed Stars
Halo
Horoscope
Lick Observatory
Meteor
Milky Way
Nadir
Nebula
Nebular Hypothesis
Node
Nutation
Observatory
Parallax
Parhelion
Perigee
Perturbations
Planet
Precession of the Equinoxes
Satellite
Solar System
Solstice
Star
Transit
Universe
Yerkes Observatory
Zenith
Zodiac
Zodiacal Light

HEAVENLY BODIES

Algol
Aquarius
Arcturus
Aries
Auriga
Bear, Great
Boötes
Cancer
Canis Major
Capricornus
Cassiopeia
Centaurus
Corona
Evening Star
Gemini
Jupiter
Leo
Libra
Lira
Mars
Mercury
Moon
Neptune
North Star
Orion
Pleiades
Pole Star
Sagittarius
Saturn
Scorpio
Sirius
Southern Cross
Sun
Taurus
Uranus
Venus
Virgo

INSTRUMENTS

Chronograph
Chronometer
Compass
Lens
Mural Circle
Quadrant
Sextant
Spectroscope
Telescope
Theodolite
Transit Instrument

EMINENT ASTRONOMERS

Brahe, Tycho
Burnham, S. W.
Copernicus
Flammarion, Camille
Galileo
Hall, Asaph
Halley, Edmund
Herschel, Sir John F. W.
Herschel, Sir William
Holden, Edward S.
Kepler, Johann
Laplace, Pierre S.
Newcomb, Simon
Proctor, Mary
Proctor, Richard Anthony
Ptolemy
Young, Charles Augustus

ASUNCION, *ah soon' see ohn,* officially known as the city of NUESTRA SENORA DE LA ASUNCION, is the capital and chief port of Paraguay, and is situated on the east bank of the broad and deep Paraguay River. The city is 970 miles, by river, almost due north of Buenos Aires. The name, piously bestowed, has reference to the Assumption of the Virgin Mary.

Asuncion was founded in 1535 by the Spanish Ayolas, and was a seat of colonial government before Buenos Aires was founded. The work of the early missionaries centering here can be compared only with that of Saint Patrick in Ireland, eleven centuries earlier, in the magnitude and quickness of its results and in its peaceful character.

The struggle of the Spanish government with the Jesuits led to deplorable results, undoing much of the missionary work. Early in the nineteenth century, when the republic was ready to start upon its career, there began the long tyranny of Doctor Francia and his nephew and grand-nephew, which retarded both the city and country. When the younger Lopez fell, in 1870, the land was ruined and largely unpeopled. Captured and ravaged by the Brazilians in 1870, and blockaded for many weeks by a revolution as late as 1905, Asuncion was late in entering fully upon its career. But the city did not lose courage; and it has recently grown with a steady pace which reveals the unquestioning confidence of the patriotic citizens in the greatness of its future. The original purpose of the Spanish in establishing a city so far from the coast was to create a southern outlet for the gold and silver and the commerce of Peru, which then included Bolivia. This original purpose may yet be realized, and Asuncion will in that event become a great midway point of commerce.

The city contains a population of 84,000. It is laid out in regular squares. The principal streets have street cars and electric lights and are well paved. There is good telephone service, and automobiles are much in use. Touring cars and motor trucks take the place of railways over the level country to points not yet reached in railway construction.. Motor boats by dozens run on the river. Although the climate is hot, it is very healthful.

Asuncion contains numerous churches, a cathedral (the bishopric dating from 1547), a national college, a public library and the palace begun by the later Lopez; but its modern development did not begin until about 1880, and its more notable buildings are so strikingly new as to remind the visitor of the young cities of North America. Examples of these are the courthouse, the national college, the agricultural bank and the municipal building. The new "port works," extensive in plan and including docks, wharves and buildings, have been undertaken by capitalists from the United States.

H.M.S.

ASYLUM, *a sy' lum,* a term applied to various institutions where unfortunate persons are cared for. Thus, *blind asylum, orphan asylum, insane asylum,* etc., are expressions frequently heard which carry the meaning in the name. The present tendency, however, is to use the term *hospital* in connection with institutions where the insane receive care and treatment. States, provinces, many counties and large cities provide for the building and maintenance of such institutions. See INSANITY, subhead *Insane Asylums;* DEAF AND DUMB; BLIND, EDUCATION OF THE.

Ancient Asylums. The name asylum comes from the Greek word *asylon,* meaning *a place safe from violence,* and in very early times the term was applied to those places where persons fleeing from justice or persecution sought refuge. Among the ancient Greeks and Romans such places were the temples and altars of the gods; among the Hebrews, they were the cities of refuge described in *Numbers* XXXV, 9-34 (see CITIES OF REFUGE). The latter custom, slightly varied, passed over into the Christian Era, and in the time of Constantine the churches were appointed asylums for those in fear of their lives. In the course of time, criminals so abused this privilege that the *right of sanctuary,* as it was called, was gradually abolished.

Right of Asylum. In the law of nations, the term *right of asylum* means the right of a state to permit those fleeing for proper reasons from other countries to remain unmolested within its boundaries. Nations make extradition treaties with each other (see EXTRADITION) so that the right of asylum may not be used to defeat the ends of justice.

ATAHUALPA, *ah ta wahl' pa,* the last ruler of a proud race of Indians, the Incas (which see), who were conquered during the Spanish invasion under Pizarro. Atahualpa became king of Quito in 1529, while his brother Huascar ruled over the kingdom of Peru. In a war between the two brothers, Huascar was defeated and imprisoned, and his kingdom fell into the hands of Atahualpa. In 1532 the Spaniards under Pizarro, and by a trick, seized Atahualpa, who to gain his liberty offered to fill the room in which he stood with gold as high as he could reach. The gold for his ransom began to pour in at once, but when he demanded his freedom Pizarro basely accused the prisoner of plotting against his life. He was condemned to suffer death by fire, and was saved from this torture only by consenting to receive baptism. Pizarro then ordered him to be strangled. See PIZARRO, FRANCISCO.

ATALANTA, *at a lan' ta,* a famous Grecian huntress who had declared that she would marry no man unless he could defeat her in a race. After many youths had met death for their failure, Hippomenes overcame her by strategem and won her hand. The tale is told in full in the article MYTHOLOGY.

ATAVISM, *at' a vis'm,* a term used to explain the appearance in animals and plants of certain special characteristics not possessed by their immediate ancestors, but which were common to remote ancestors. It is improper to use the term atavism unless the throw-back is to ancestors more than two generations remote. Atavism and reversion, in this sense, become like terms. Hybrids in plants, and the sixth finger or toe in man, are examples of atavism. See HEREDITY; EVOLUTION; HYBRID.

ATCHAFALAYA, *ach a fa li' ah,* an Indian term meaning *lost river,* is a river of Louisiana, an outlet of the Red River and occasionally of the Mississippi, carrying part of the overflow from those streams in times of flood. It flows southward, and enters the Gulf of Mexico by Atchafalaya Bay. Its length is 220 miles, the greater part of which is navigable by small river vessels, which carry most of the local commerce.

ATCHISON, *atch' i s'n,* KAN., is the county seat of Atchison County, in the northeastern part of the state, forty-nine miles northwest of Kansas City, and thirty-five miles southwest of Saint Joseph. It is on the right bank of the Missouri River, which is navigable at this point but is little used for freight transportation, and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Missouri Pacific, and the Chicago, Burlington & Quincy railroads. A fine steel bridge crosses the river here. The population, which in 1910 was 16,429, was 12,630 by the Federal census of 1920. The area is nearly three square miles.

Atchison is an important railway center and handles a vast amount of freight, particularly grain, flour, lumber, and live stock. It is also the supply center in groceries, drugs and hardware, for a large part of the state. Railroad car shops, foundries, grain elevators, flour, corn-products and oatmeal mills, lumber mills and manufactories of furniture, carriages and harness, are among the important industries. The city has Central, Forest and City parks, a fine Union depot costing $140,000, Federal building, courthouse, hospital and public library.

It is the seat of Midland College (Lutheran), Saint Benedict's College (Roman Catholic), Mount Saint Scholastica's Academy (Roman Catholic), and has a State soldiers' orphans' home.

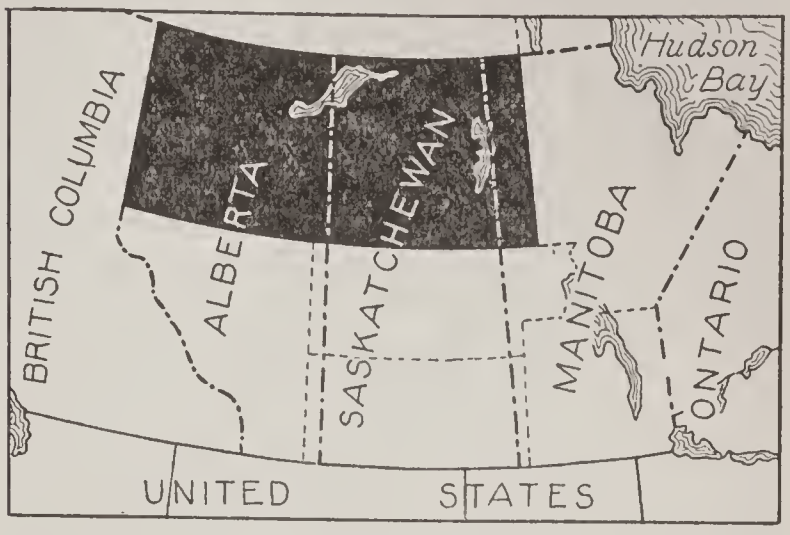
Atchison was named in honor of David Rice Atchison, a United States Senator, the leader of a group of people in sympathy with slavery, who settled here in 1854. The place became a city in 1858.

ATHABASKA, *ath a bas' ka,* or **ATHABASCA,** an English corruption of the Indian word *Athepescow,* which means a *place of hay and reeds.* The name has been given in turn to a tribe of Indians (see ATHAPASCAN INDIANS), to a river and a lake in Canada, to a large district of the Northwest Territories, to a mountain and to a town in Alberta. Each of these is described below.

Athabaska River, in Alberta, a part of the great Mackenzie River system. The Athabaska rises on the eastern slope of the Rocky Mountains; one of its branches starts near Yellowhead Pass, through which the Grand Trunk Pacific finds a way over the mountains, and another rises farther south, in Athabaska Pass, just north of Mount Hooker. From its source the river flows east and then north, pouring its waters into Athabaska Lake after a course of nearly 750 miles. Emerging from the western end of Athabaska Lake it flows northward for fifteen miles and unites with the Peace River to form the Slave River, which in turn passes into the Mackenzie. The drainage basin of the Athabaska River comprises 58,900 square miles.

Athabaska Lake, into which the river flows, has an area of 2,842 square miles (considerably more than twice the size of Rhode Island), of which 1,041 square miles are in Alberta and the remainder in Saskatchewan. It is the fourth largest lake lying wholly in the Dominion. Its average width, from north to south, is from twenty to thirty miles, and its length from east to west is about 200 miles. Its name (see above) accurately describes most of the country surrounding the lake, especially the southern shores, which are low and sandy. The northern banks are higher, rocky and covered with timber, chiefly fir, spruce and poplar. The level of the lake is about 700 feet above that of the sea. The lake is a noted breeding ground for the Canada goose.

Athabaska, a former district of Canada, organized in 1882 as a part of the Northwest Territories. It was enlarged in 1895, and then contained 251,300 square miles. It lay between the parallels 55° N. and 60° N., and between the meridians 100° W. and 120° W. In 1905 the



ATHABASKA

Part of Western Canada, showing the former district of Athabaska, in solid black. The light, broken lines show the boundaries of other districts of Northwest Territories before 1905; the heavier lines are present provincial boundaries.

district of Athabaska was divided: the western part became the northern half of Alberta; the central part, the northern half of Saskatchewan; and a small strip on the east was given to the district of Keewatin. This last part in 1912 was added to the province of Manitoba. For details of the physical characteristics and other interesting information about this section, see ALBERTA; MANITOBA; SASKATCHEWAN.

Athabaska, MOUNT, one of the lofty snow-topped peaks in the Canadian Rockies. It towers to a height of 11,700 feet above sea level, and is situated in the west central part of Alberta, near the British Columbia boundary, only a few miles east of Athabaska Pass, in which the river of the same name rises. Its position is 52° 10′ north latitude.

Athabaska, formerly called ATHABASKA LANDING, a town in Alberta, at the head of navigation on Athabaska River, and 100 miles north of Edmonton on the Canadian Northern Railway. It is in the midst of a rich lumbering district, which gives it its chief industry, the milling and shipping of lumber. Athabaska was originally a fur-trading post, and its population averaged about 200. With the building of the railroad, however, has come an increase in population; the population in 1921 was reported as 425. J.M.S.

ATHAPASCAN, *ath a pas' kan,* **INDIANS,** a widely distributed family of North American Indians who were scattered over that vast region of Western Canada and the United States from Alaska as far south as New Mexico and Arizona. There were three main divi-

sions. The Northern group occupied the region of Alberta, Canada, and lived by hunting and fishing; the Pacific group occupied permanent villages along the western coast in Oregon and California; the Southern division lived in isolated groups in New Mexico and Arizona. Such important tribes as the Apache and the Navajo are members of this family, which exhibited throughout a greater similarity in language than in tribal manners and customs. With the exception of the two tribes named above, they have not been warlike tribes. In general, the Athapascans always showed a strong tendency to adopt the civilization of any other tribes with whom they came into contact, and missionaries have found this imitative faculty of great help in dealing with them. There are at the present time about 50,000 Athapascans living in the United States, Canada and Alaska. See INDIANS, AMERICAN.

ATHEISM, *a' the is'm,* the belief of those who declare that there is no God. The atheist and agnostic are sometimes confused, but they are not the same, for the latter merely claims that one cannot prove that God exists, or that he does not exist (see AGNOSTIC). Belief in a Supreme Being is so natural to mankind that even those who deny that God exists very often set up some sort of an ideal of their own to take the place of the God they refuse to admit. The term *atheist* has been applied very loosely from earliest times, for in matters of religion the tendency in all ages has been to call a man an atheist who departs from a generally-accepted creed. The ancient Greeks imprisoned Socrates for "not believing in the gods the city believes in," and the Romans of Nero's time sent the Christians to their death to the cry of "Away with the atheists!"

ATHELSTAN, *ath' el stan* (895-940), the first ruler to bear the title of king of England, was the grandson of Alfred the Great. He succeeded his father, Edward the Elder, in 925, put down a revolt of the Welsh, Scotch and English, and after his victory at Brunanburh, which has been celebrated in Saxon song, ruled with wisdom and justice.

ATHENAEUM, *ath e ne' um,* any one of the ancient Greek temples dedicated to the goddess Athene, but especially that temple in Athens where poets and other literary men met to read their productions. At Rome, a celebrated school on the Capitoline Hill having this name was founded by the Emperor Hadrian about 135. In the building, which had the form of a theater, literary productions were read, lectures delivered, and recitations conducted. As teachers who were paid salaries were attached to the Athenaeum, it was in a measure a university, and as such was in existence until the fifth century. Schools of a similar character and bearing the name athenaeum were founded in various cities of the Roman provinces.

At the present time schools ranking next to the universities in Holland and Belgium are known by this name, and it is also applied to scientific clubs and literary societies, to the buildings in which these clubs meet, and sometimes to literary magazines. Among the latter is an important periodical founded in London in 1828.

ATHENE, *a the' ne,* also spelled ATHENA. See MINERVA.

ATHENS, *ath' enz,* one of the most famous cities the world has ever known. Today it is the capital of the kingdom of Greece, but its great fame dates from the time when it was the capital of ancient Attica. It lies on a plain between the mountains and the sea, about five miles from the harbor of Piraeus, its ancient seaport, and its elevation of 350 feet above sea level secures to it a temperate, sunny climate. Nowhere are the skies bluer and more beautiful than over Athens.

Its Story. The Athenians boasted that their ancestors had not migrated from some other section of the world—that they had sprung

from the beloved Athenian soil. Their first king, according to these traditions, was Cecrops, but the most famous was Theseus, celebrated for his victorious conflict with the dreadful Minotaur. (See the three titles, in their places in these volumes.) This king united under his sway the twelve independent little states of Attica, and made Athens really a capital. In time there came a king, Codrus, whom it was felt there was no one worthy to succeed, and the state was accordingly organized as an oligarchy, or government of the nobility, with a chief magistrate known as the *archon*. In time the number of archons was increased to nine. See ARCHON.

Like the early Romans these early Greeks in time found their aristocratic form of government very unsatisfactory, for the rulers were bound by no written laws and could thus practice any oppressions they chose. The lower classes, therefore, finally revolted and demanded written laws, but when these were drawn up about 621 B. C. by Draco (which see) they were found to be so severe that they bettered matters not at all. Solon, one of the wisest of men, was then chosen, about 594 B. C., to make a new code, and this gave relief by introducing many democratic features (see SOLON).

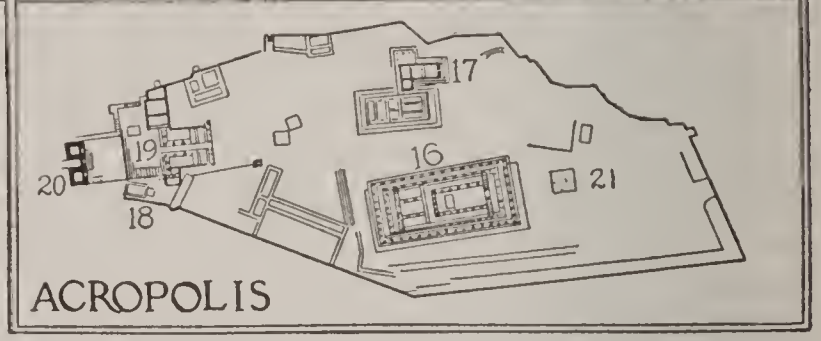
There were still disturbances, however, and in 561 B. C. Pisistratus secured the aid of a large dissatisfied class and made himself tyrant, or absolute ruler. The city prospered under his rule, however, and under that of his sons Hippias and Hipparchus, and was adorned with many beautiful new buildings. But the Athenians could never submit long to even such benevolent tyranny, and in 509 B. C. a new constitution, proposed by Clisthenes, made of the state a democracy. This document, while it introduced little that was actually new into the government, provided for the new conditions which had grown up since the time of Solon. Athens was divided into 100 divisions called *demes,* and each citizen was enrolled in one of these divisions. Ten of the demes, not adjacent but as widely scattered as possible, composed a *ward,* and thus the political unity of the old clans which had caused so much trouble was destroyed. Many of the foreigners throughout Attica were also enrolled as citizens.

In 499 Athens generously sent to the Ionian colonies in Asia Minor help in their struggle against Persia, and the result was the Persian Wars (see GREECE, subhead *History*) which freed Greece for all time from the danger of invasion by that ambitious power. At the close of the conflict Athens was the leader of Greece, and proceeded to strengthen its position by organizing the Confederacy of Delos. The original purpose of this was the protection of Greek colonies from Asiatic rule, but it speedily developed into a real Athenian Empire. The fifty years following were the most brilliant in Athenian history; under Pericles, especially, Athens was the literary and artistic center of Greece. (See subhead below, *The Ancient City,* and the article PERICLES).

But Sparta, in Southwestern Greece, had watched jealously the rise to power of its rival, and in 431 B. C. it demanded that Athens break up the Delian Confederacy and free all the Greek cities. Athens in reply insisted that Sparta relinquish its conquests in the Peloponnesus, the southern peninsula of Greece, and the result was the Peloponnesian War (see GREECE, subhead *History*), at the close of which Athens found itself defeated and under the domination of Sparta. A government by Thirty Tyrants (which see) was established, but before long the democracy was again in force.

Though Athens never regained its former political position, it remained the intellectual center of Greece. Under Macedonian and later under Roman rule people still flocked to it as a center of culture, and a number of the Roman emperors favored the city to the extent of erecting new and gorgeous buildings. It played a distinct part in Roman history, for thither for centuries were sent the sons of wealthy Roman families to finish their education. But from the time of Justinian (A. D. 529), who closed the schools of philosophy, until the eleventh century, the history of Athens was not at all important.

During the twelfth, thirteenth and fourteenth centuries it was sometimes independent, sometimes subject to an Italian city or to Turkey, but always growing poorer and more wretched. In the fifteenth century the rule of Turkey was firmly established, but nothing was done to build up the city until it became, after the Greek revolution in 1835, the capital of the new kingdom of Greece. Since then it has had the life and history of an enlightened European capital. One of the most interesting happenings connected with it in recent years has been the establishment of the new Olympic games and restoration in 1902 in marble of the great Stadium (see OLYMPIC GAMES; STADIUM). The excavations carried on in the city and its



PLAN OF THE ANCIENT CITY

(1) Acropolis
(2) Theater of Dionysus
(3) Temple of Dionysus
(4) Olympieum
(5) Tower of the Winds
(6) Hill of the Nymphs
(7) Areopagus
(8) Theseum
(9) Stadium
(10) Long Walls
(11) Sacred Gate
(12) Lyceum
(13) Arch of Hadrian
(14) Aqueduct of Hadrian
(15) Agora, or market place
(16) Parthenon
(17) Erechtheum
(18) Temple of Victory
(19) Propylaea
(20) Pedestal of Agrippa
(21) Temple of Rome

vicinity during the past decades have resulted in the recovery of many monuments of the past.

The Ancient City. When ancient Athens is spoken of it is Athens in the time of Pericles which is meant, rather than Athens throughout its long growth or its later period of decay. In the Age of Pericles, then, Athens was a strong walled city, built about the *Acropolis,* a rocky elevation about 300 feet above the level of the city, having on its summit a comparatively level area of somewhat less than ten acres (see ACROPOLIS). Originally this was the fortress to which the inhabitants retreated in time of danger. It could be reached only on the west, where a stairway of sixty marble steps led to a series of colonnades and porticoes called the *Propylaea,* or *Gateway,* a magnificent structure built of white marble and trimmed with black marble. Just within the entrance was the great statue of *Athena,* the patron and defender of the city, and on the right, a little to the rear, was the Temple of the *Wingless Victory.* To the right of the center rose the crowning glory of Athens, the *Parthenon,* an exquisitely beautiful temple dedicated in 438 B. C. (see PARTHENON), and to the left stood the *Erechtheum,* a beautiful temple of which there still remains the famous Porch of the Maidens (see CARYATIDES).

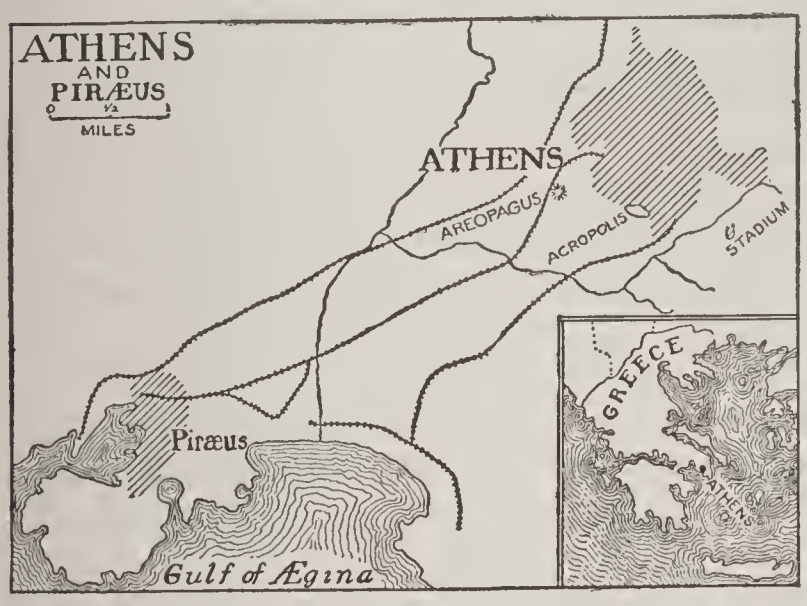
The city surrounded the Acropolis on every side, extending to a distance of about a mile therefrom. To the north and directly in front of the Acropolis was the *Tower of the Winds,* an octagonal marble structure erected in 159 B. C. and still fairly well preserved; to the west were the *Hill of the Nymphs* and the *Areopagus* (Mars Hill), the rocky eminence from which Paul is supposed to have preached to the Athenians; and to the northwest lay the *Theseum,* which remains the best preserved of all the ancient Greek temples. On the southwest slope of the Acropolis was the ancient *Theater of Dionysus,* and beyond it the stately *Olympieum,* begun about 535 B. C., but not finished until 700 years later.

Under the Romans, Athens was a flourishing city which in the second century Hadrian ornamented with many new buildings; but after that time much of the beauty of the city was destroyed, and the pagan temples became for the most part Christian churches

and, later, mosques. During the seige of Athens by the Venetians in 1687 the Parthenon was used by the Turks as a powder magazine, and was greatly damaged by an explosion.

The Modern City. Clustered about the foot of the Acropolis there lies the so-called Old City, a remnant left from the dreary days before the revival of Athens in 1835; and in a great crescent about it spreads the new city, with its broad boulevards radiating from the central Square of Harmony, and its handsome public buildings. Of these structures the most magnificent is the royal palace, a structure of Pentelic marble which stands in a beautiful, well-kept park somewhat apart from the city. The National Archaeological Museum, which houses an unsurpassed collection of antiquities; the House of Parliament; the National Library and the National University also have noteworthy buildings, while the Stadium, restored through the generosity of an Alexandrian Greek, has attracted the interest of all the athletic world.

Though Athens has excellent schools and a National University with about 2,500 students, ancient Athens so far outweighs the modern city in public interest that it is for its archaeological schools that the city is most generally



LOCATION OF ATHENS

The port of Piraeus was occupied by the British and French allied forces in September, 1916, in the War of the Nations.

noted. These, which include the American School of Classical Studies, maintained and supported by the universities of the United States, the French and British schools and the German Archaeological Institute, combine instruction with investigation, and have made discoveries and restorations of great importance.

Though the financial center of Greece, Athens has few manufactures and engages only in domestic trade. Rugs, silks, scarfs, brass and copper ware—such articles as the tourist

Outline and Questions on Athens

I. Ancient Athens

(1) Its beauties
- (a) Location
- (b) Acropolis
- (c) Parthenon
- (d) Erechtheum
- (e) Theseum
- (f) Other buildings

(2) History
- (a) Legendary period
- (b) Government by archons
- (c) Legislation of Draco
- (d) Legislation of Solon
- (e) The tyrants
- (f) Democracy established
- (g) Persian wars
- (h) Age of Pericles
- (i) Peloponnesian War
- (j) Roman rule

II. Modern Athens

(1) Appearance
- (a) The old city
- (b) Streets and buildings
- (c) Institutions
- (d) Industrial Life
- (e) Population

(2) History
- (a) Under Turkish rule
- (b) Capital of new kingdom
- (c) Olympic games
- (d) Archeological investigations

Questions

In what way did Athens retain its supremacy for centuries after it lost its independence?

What state, through jealousy, brought about the downfall of ancient Athens?

In what way is it evident in the Athens of to-day that the ancient city is of more importance than the modern?

When was the period of greatest glory?

What geographic relation does the modern city bear to what remains of the old city?

When was the most beautiful building in the world used as a powder magazine?

What was the difference between the laws of Draco and those of Solon?

What spot in ancient Athens was connected with a dramatic event in Bible history?

What was the original purpose of the Acropolis?

loves to bring back with him from his visit—are its most important manufactures. Its population, which at its early period of greatness is supposed to have been about 200,000 but which shrank, quite gradually, during the Middle Ages to a few thousands, was, in 1907, 167,479. A.MC C.

Further information on the relations of Athens to Greece is given in the article GREECE, subhead *History.* Consult Butler's *The Story of Athens;* Gardner's *Ancient Athens.*

ATHENS, GA., an important seat of learning and also a leading cotton market, with a population, largely American, of 16,748 in 1920, an increase of 1,835 since 1910. It is situated in Clarke County, of which it is the county seat, in the northeastern part of the state, on the Oconee River. Atlanta is seventy-three miles southwest, Macon is 105 miles south, and Augusta 114 miles southeast. Its railroads are the Georgia, constructed to the city in 1841, the Central of Georgia, built in 1888, the Gainesville Midland (1906) and the Seaboard Air Line (1891). The founding of the city in 1801 was due to a grant of 600 acres of land to the state by John Milledge to establish a "seat of learning." The University of Georgia was the first state university founded in America (see GEORGIA, UNIVERSITY OF). The area of the city is about seven square miles.

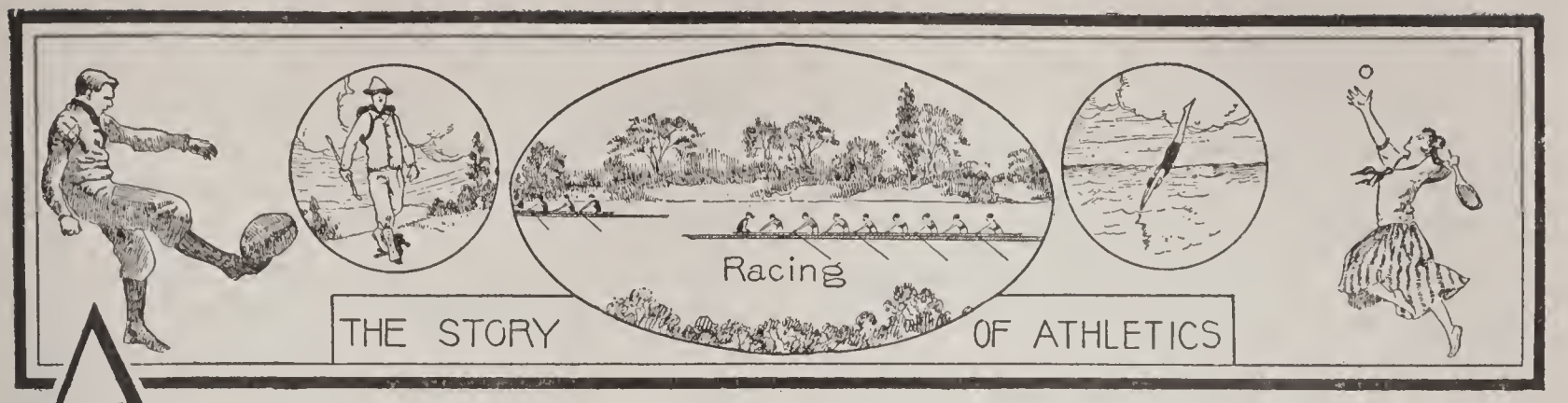
In its own territory, Athens is known as the *Classic City of the South,* on account of its educational institutions. It is located at the foothills of the Blue Ridge Mountains, about seventy-five feet above the river and surrounded by picturesque scenery. This location is in the heart of a rich agricultural region that produces fruit, grain and an abundance of cotton. Athens is the second largest cotton market in the state and its industries are largely engaged in the manufacture of this product. Eight cotton mills and one cotton-oil refinery employ a large number of people; besides these, there are two oil mills, one sulphuric acid plant and three fertilizing plants. The buildings worthy of note are the $115,000 Federal building, completed in 1911, the $250,000 Insurance building, built in 1907, the $150,000 Georgian Hotel, the $175,000 Holman building, the $200,000 county courthouse, built in 1914, and an $80,000 city hall. Besides the state university, with the Peabody Library, there are the state normal school, with a Carnegie Library, the state college of agriculture, the Lucy Cobb Institute, the Knox Institute, the Jeruel Academy and two high schools. C.H.D.

ATHENS, OHIO, the county seat of Athens County and an industrial and educational center, situated in the southeastern part of the state, seventy-five miles southwest of Columbus. It is on the Hocking River and on the Baltimore & Ohio Southwestern, the Toledo & Ohio Central and the Hocking Valley railroads. Athens is an important coal-mining center and has lumber and brick plants. Prominent features of the city are the Ohio University, opened in 1804, a state hospital for the insane and a Carnegie Library. The place was settled in 1797 and incorporated in 1811. Its population in 1910 was 5,463.

ATHENS OF AMERICA, THE, or THE MODERN ATHENS, a name applied to Boston, Mass., at the time when the city was the foremost literary center of America. The names of Longfellow, Holmes, Lowell and other noted writers are forever associated with the place, and it still has a claim to the title as a center of art, music and education.

ATHERTON, GERTRUDE FRANKLIN (1857-), an American novelist, a great-grandniece of Benjamin Franklin, and one of the most alert, independent and forceful of the modern group of American writers. She was born in San Francisco and educated in California and Kentucky. Mrs. Atherton's novels show a surprising range of background and material. Sometimes the scenes are laid in her native state, as in *The Californians* and *Ancestors; Aristocrats* is a story of the Adirondacks; *Senator North* gives a brilliant picture of the social and political life of the nation's capital; *Patience Sparhawk,* written in a vein of satire, presents life in New York and Westchester County. *The Conqueror,* the only one of her stories which claims to be a historical novel, is based on the life and character of Alexander Hamilton, and is the only effort at historical writing ever made by her.

Mrs. Atherton is deeply interested in modern social problems, in the democratic movement of the times, and in the struggle for woman's rights; these interests are reflected in her novels. She has a broad outlook on life, and views all of its phases with the clear, far-seeing eye of the realist. Her independence makes her scornful of accepted literary rules, and she has her own methods of style, construction of plot and manner of telling a story. Critics have sometimes called her an "intellectual anarchist." Among her latest novels are *Tower of Ivory, Julia France and Her Times, Transplanted* and *The Sisters-in-Law.*



ATHLETICS, *ath let' iks.* Originally this term was applied to any kind of outdoor sports. More recently, however, its use has been restricted largely to trials of speed, strength, skill or endurance among a number of contestants.

Professional Athletics. According to the way in which they are organized, athletic contests may be divided into two groups—professional and amateur. The chief professional sport of the United States and Canada is baseball; its popularity fills foreigners with a never-ending wonder. The United States has two Major leagues and both it and Canada have a number of smaller ones, and enormous sums are spent annually in hiring players, erecting stands and maintaining grounds. Such expense can be supported only by heavy gate-receipts, and baseball has become a business, conducted like any other, for gain, although possessing great elements of sporting rivalry (see BASEBALL).

Amateur Athletics. Amateur athletic contests, on the other hand, are conducted without thought of gain. They are enjoyed as a spectacle, and practiced, in theory at least, for the physical benefit of the players. It is the mark of the amateur that he does not play for hire, and great care is exercised to exclude athletes who have accepted money for their athletic prowess. Certain ideals of fair play are cherished by the amateur, who makes it a point of honor to be a "good loser." Amateur athletic events are arranged among groups of athletic societies, cities, schools and colleges. In the United States such events are conducted under the supervision of the Amateur Athletic Union, which is allied with the Canadian Amateur Athletic Association, or, as in the case of the colleges under that of the Intercollegiate Association of Amateur Athletes of America. The effect of these organizations has been to standardize rules and promote regularity. They have played a considerable part in arranging international contests.

The chief athletic games represented in these contests are football, baseball, basket ball and lawn tennis, as well as field and track games and gymnastics (see FOOTBALL; BASKET BALL; LAWN TENNIS). The swinging of dumb-bells and Indian clubs, weight-lifting and practice on the horizontal bar are grouped under gymnastics. Track games include running for various distances, from twenty-five yards to two miles or more, and leaping over hurdles. Among the more familiar field games are pole vaulting, high and broad jumping, putting the shot and throwing the hammer, javelin or the discus. Canadians share the British fondness for cricket, and they excel in playing their national game, lacrosse. This is played both as a professional and an amateur game. There are several lacrosse clubs in the Dominion, including the National Lacrosse Association of Canada, the Toronto Lacrosse Club and the Capital Lacrosse Club (Ottawa). Hockey, too, is an exceedingly popular game.

In the United States, college athletics occupy a very prominent place. The chief game, from the point of view of popular interest, is football, which is almost wholly an amateur sport. Enormous crowds, even larger than those that witness championship games of baseball, crowd the stadium at Harvard or pour into the Yale "Bowl" to witness the triumph or defeat of a team of eleven young men in dusty uniforms, with grotesque leather headguards. The excitement is intense, the enthusiasm boundless. The desire to produce a winning team has resulted, doubtless, in a high degree of specialization, so that the benefits of athletics tend to be confined to smaller and smaller groups rather than shared by the student body as a whole. This has resulted of late in no little criticism, and efforts are being made to cleanse college athletics of the taint of professionalism as well as from too great specialization.

Training. To gain the wind, the skill and endurance that will enable him to withstand the prolonged strain of contests on field or track, the athlete has to subject himself to

careful training. Athletic organizations commonly hire trainers and coaches as well as physical directors to help the athletes to get into condition and to give them special training for the games in which they will compete. Trainer and coach show the novice how to use his effort in the most economical and telling way, and perfect him in what is called "form." To acquire skill in pole vaulting, for example, requires long and patient practice; and the time in which a sprinter can cover a short distance, like twenty-five yards, is determined largely by the spring-like swiftness of his start.

During the training season, proper food and plenty of sleep are of the first importance. Members of athletic teams in the colleges eat, usually, at a common table, the dishes of which are carefully selected and supervised. Simple, wholesome food is the rule; rich and exciting sweets are banished. Tobacco and liquor are forbidden, since their harmful effects are well established. The athlete goes to bed, not precisely like the little boy in Stevenson's poem, "by day," but early enough to get eight or nine hours of sleep each night. His muscles are regularly rubbed and kneaded by a trainer to take out the stiffness and render them supple. A "rub-down" with alcohol supplements regular and frequent bathing. A bath after violent exercise on a dusty or muddy field is, of course, indispensable, and the shower-bath is preferred by most physical directors.

Athletics an Aid to Health. There is no surer road to the goal of perfect health than regular exercise in the open air, and every boy and girl should have a thorough knowledge of at least one sport or recreation, such as baseball, hockey, tennis, golf, swimming or horseback riding. For stirring up the blood, developing the muscles, clearing the head and stimulating the appetite—in fact, for building up a strong, healthy body—nothing is better than athletic games. Moreover, engaging with others in wholesome sports helps one to overcome many undesirable traits of character—laziness, timidity, conceit, lack of consideration, etc. It should always be kept in mind, however, that over-indulgence in sports is as harmful as intemperance in eating and drinking. The player should temper his enthusiasm according to the limits of his bodily endurance, and never subject any part of the physical machine to undue strain. One of the common errors to avoid is sitting in a breeze "to cool off" while the body and clothing are wet with perspiration.

Outline and Questions on Athletics

I. History

(1) The Olympian Games
(2) Athletic games of the Romans
(3) Knightly jousts and tournaments
(4) Later athletic sports among the Anglo-Saxon peoples
(5) Revival of the Olympian Games

II. Modern Athletics

(1) Professional
  (a) Baseball in the United States
  (b) Lacrosse in Canada
  (c) Cricket in England
(2) Amateur
  (a) As a source of amusement
  (b) As a physical benefit
  (c) Standard rules
  (d) International contests
  (e) College athletics
(3) Training
  (a) Under directors and coaches
  (b) Regulation of sleep and diet
  (c) Care of the body

III. Benefit of Athletics

(1) An aid to health
(2) An aid in character-development
(3) Harm in over-indulgence

Questions

Is there such a thing possible as over-indulgence in athletic sports?

Distinguish between athletic games, gymnastics, track games and field games.

Which nation has kept up the athletic traditions most consistently through the centuries?

Describe the rigorous training which members of college teams have to undergo.

What is the Yale "Bowl"?

Is a player who sulks or protests when he loses considered a fair type of athlete?

How do we know that no country has ever surpassed Greece in the perfection of its physical manhood?

What did the Olympian Games mean in ancient times? What do they mean to-day?

What is regarded as the national game of Canada? Of the United States? Of England?

What advantage could come to a selfish boy from playing baseball?

What danger to college athletics arises from the keen desire to win championships?

Historical. The recent renewal of the Olympian games serves to show the great antiquity of many of the athletic contests of to-day, while expressing in a definite way the indebtedness of the modern world to Greece (see OLYMPIAN GAMES). The Greeks were the first people of antiquity to organize sports. The Greek athlete was as conspicuously honored by the citizens as the tragic poet or the leader in battle. The victor in the Olympian games was crowned with a wreath of wild olives in front of the temple of Zeus; poets celebrated him in verse, and his triumphal return to his native city was marked by songs and processions. Greek sculpture preserves for us the comely bodies of the athletic youth of the best period, bodies in which grace and strength are marvelously blended (see SCULPTURE). The Romans, who learned much from the Greeks, imitated them also in their games, but without that moderation which was the ideal of the Greek philosophy and which was reflected in detail in the daily lives of the people of Athens.

Chivalry carried on the tradition of bodily prowess, the knightly jousts corresponding somewhat to the games of the classic world (see CHIVALRY). Later on, however, in the refinements of court life and in their zest for social pleasures, the Latin peoples of the south of Europe neglected athletic sports, and their interest in them has only recently been revived. In the North the case was different. For a short period only did interest in sports languish in England, for the athletic tradition is very strong among Anglo-Saxon peoples, and boxing and wrestling are regarded almost as English sports. The Scandinavians and the Germans have also cultivated sports with great zeal. W.C.

Consult Spaulding's editions of rules and games of all kinds; Barbour's *Book of School and College Sports;* Anderson's *The Making of a Perfect Man.*

Related Subjects. In the following index are listed the athletic sports which are discussed in these volumes. Many closely related topics are given in the list under GAMES AND PLAYS and AMUSEMENTS.

Archery
Aquaplaning
Baseball
Baseball, Indoor
Basket Ball
Battledore and Shuttlecock
Bowling
Boxing
Cricket
Curling
Discus, Throwing the
Dumb-bells
Fencing
Fives
Football
Football, Association
Golf
Hammer, Throwing the
Hand Ball
Hockey
Hurdling
Lacrosse
Lawn Tennis
Olympian Games
Pole Vault
Polo
Race
Rowing
Shot, Putting the
Skates and Skating
Ski
Swimming
Tennis
Wrestling

ATHOR, *ah' thor,* or **HATHOR,** the Egyptian goddess of music and the dance, of joy and love, corresponding to the Aphrodite of the Greeks. In early times the Egyptians used a buffalo's skull raised on a pole in connection with her worship, and from this came the sacred Athor column of Egyptian architecture, which has on the top a female head with the ears of a cow. Athor, the third month of the Egyptian year, was named for her.

ATHOS, *ath' os,* MOUNT, a mountain peak on the northeast coast of Greece, of special interest because of the monasteries on its slopes, which date from the Middle Ages. Mount Athos is on the southern point of the most eastern of the three peninsulas that project, like the prongs of a fork, into the Aegean Sea. Its summit of shining white marble, 6,350 feet above the plain, can be seen from a great distance; from the sea, the view of the "holy mountain," with its picturesque dwellings of a noted community of monks is wonderfully attractive. The name properly applies to the entire peninsula, which is joined to the mainland by a neck of land only a mile and a half wide. On this isthmus are yet traces of the canal that the Persian king Xerxes had constructed in 480 B.C., just before he invaded Greece.

The religious community, occupying both the peninsula and mountain, consists of twenty monasteries of the Order of Saint Basil, and a number of monastic settlements, farms and hermitages. Most of the monasteries are occupied by Greek monks, but there are a number of Russians, Serbs and Bulgarians. For many hundreds of years, it is asserted, no woman has been allowed to approach this great monastic community, because under a constitution granted by the emperor Constantine Monomachos in 1045, women are barred from the "holy mountain," which at the present time has a population of 6,000 to 7,000. About one-half of this number are monks, while the rest are lay brothers. The monks engage in farming, fishing and various trades, but are not remarkable for intellectual culture. The monasteries, however, contain many manuscripts of historic interest, besides paintings, mosaics and golden ornaments that are interesting examples of the art of the Eastern Roman Empire.

ATLANTA, GA., the capital, the largest city of the state and the county seat of Fulton County, is situated in the northwestern part of the state, about seven miles from the Chattahoochee River. Macon is about 100 miles southeast and Augusta is 171 miles east. It is popularly called the *Gate City of the South,* on account of its excellent transportation facilities, being served by the following railways: Western & Atlantic; Central of Georgia; Georgia; Louisville & Nashville; Nashville, Chattanooga & Saint Louis; Southern; the Atlanta & West Point; Atlanta, Birmingham & Atlantic railways, and the Seaboard Air Line. Electric lines run from the city in all directions. The city has grown rapidly, from a population of 2,572 in 1850 to 200,616 in 1920; of these, 62,747 are negroes; all other nationalities numbered only 35 persons. The city limits originally described nearly a circle, with the Union Depot as the center, but the boundary has been broken by the annexation of several suburbs.

Atlanta has a delightful and healthful location near the Blue Ridge Mountains, 1,050 feet above sea level, this ridge being the divide between the watershed of the Gulf of Mexico and that of the Atlantic Ocean. The elevation gives the climate an invigorating effect. Historically and commercially, the city is one of the most conspicuous in the South; it also enjoys high rank as an educational center.

Parks and Streets. About 850 acres are assigned to parks and recreation grounds, the most prominent being Grant, Piedmont and Lakewood parks. Druid Hills, Brookwood and Ausley Park are among the most desirable residence districts. The streets are made attractive by grassy lawns and trees; among the finest avenues are Peachtree Street and Capitol Avenue. There are golf courses, country clubs and good country roads. The United States army post, Fort McPherson, is a point of interest in the vicinity. A monument in memory of Lieutenant Brumby, who was the first to raise the United States flag at Manila, is one of the city's ornaments.

Educational and Public Institutions. Atlanta is the seat of the Georgia School of Technology, which is a branch of the State University at Athens; it also is the home of Atlanta University, Clark University, Atlanta Baptist College, Atlanta College of Physicians and Surgeons, Atlanta School of Medicine, Emory University, Agnes Scott College nad Cox College. An excellent public school system, a Carnegie Library and the state library, with over 80,000 volumes, also serve educational interests. There are also about forty newspapers. Six institutions are devoted to the education of negroes, who form about one-third of the population. The city has a number of high class sanatoriums. The most notable structure is the capitol, which was completed in 1889 at a cost of $1,000,000. The $1,000,000 Federal building, the Union Station, erected at a cost of $900,000, the chamber of commerce, the city hall, the auditorium, with a seating capacity of nearly 8,000, and the Hurt building are among the noteworthy buildings. Atlanta is the location of one of the Federal Reserve banks. A Federal prison is also located here.

Commerce and Enterprise. Atlanta has an extensive export trade in cotton, tobacco, grain, horses and mules. Its tobacco trade is the largest south of Richmond, Va., and it ranks second in the United States as a mule market. The industrial products include cotton goods, furniture, shoes, steel products, flour, lumber, cottonseed oil, patent medicines and beverages. There are several large cotton and fertilizer factories. A dam across the Chattahoochee River furnishes abundant power for the manufactories, which are rapidly increasing.

History. The first settlement at Atlanta, in 1837, was called Terminus. It was incorporated as a town in 1843, under the name of Marthasville; the present name was adopted in 1845, and the city charter was granted two years later. It was an important strategic point in the War of Secession as early as 1861, when it was the depot for Confederate military supplies. This made it an objective point in

General Sherman's famous march to the sea. After a siege of several weeks it was taken in September, 1864, and a few days afterward Sherman ordered all civilians to leave within five days, when the city became an immense military camp. On the evacuation of the troops in the following November, the city was almost totally destroyed by fire. Sherman described the strategic position of Atlanta as in the wrist of a hand, the five fingers pointing to the five principal ports of the Gulf of Mexico and the Southern Atlantic coast.

Since the close of the war the growth and enterprise of the city has been so marked that it is frequently called *The Chicago of the South*. During the reconstruction era Atlanta became the capital of the state (1878). The Cotton Exposition in 1881 and the International Exposition in 1895 were important factors in the progress of the city. In May, 1917, one of the most disastrous fires in the history of any city destroyed seventy-five city blocks, but the fine residence section was spared. H.J.

ATLAN'TIC CITY, N. J., a seaside resort of note, which has one of the best beaches along the Atlantic coast. The city is situated on an island known as Absecon Beach, which is ten miles long and three-fourths of a mile wide. Absecon lighthouse, 167 feet high, is on the northern end of the beach. The island is separated from the mainland, the south New Jersey coast, by a narrow strait and meadows from four to five miles wide which are only partly under water at high tide. Lines of the Pennsylvania and Reading railroads connect the city with Philadelphia, fifty miles northwest, and New York, 150 miles north by east. Interurban electric lines run to other towns on the island and along the coast. The area of Atlantic City is nearly five square miles. In 1910 the population was 46,150; the Federal census of 1920 reported an increase to 50,682. There are many visitors the year round and in summer the number totals between 300,000 and 400,000.

The *board walk* along the beach is one of the world's famous promenades. It consists of a board flooring laid upon steel and concrete foundation, and is eight miles long. Some of the newer parts are concrete. From the walk toward the mainland extend six large piers. West of the walk are the largest and best known of the city's many hotels. Among these are Hotel Traymore, costing $4,000,000, and the Marlborough-Blenheim, costing $2,000,000. In the city are the Mercer Memorial Home for Invalid Women, the Children's Seashore House, several seaside sanatoriums and two large hospitals. The Federal building, which cost $150,000, and the Carnegie Library are noteworthy buildings, and Inlet and Chelsea parks are recreation grounds.

In 1854 the Camden & Atlantic Railroad was completed to the little settlement, which dates from 1780. In that same year it received the name Atlantic City. Its rapid growth has been due to its unexcelled beach and its nearness to New York and Philadelphia. In 1902 a fire destroyed a number of hotels and a part of one of the best piers, causing a loss of $780,000. The commission form of government was adopted in 1912. W.B.D.

ATLAN'TIC OCEAN, that division of the world-enveloping sea lying between Europe and Africa on the east and North and South America on the west. It is named from Mount Atlas, in the northwestern part of Africa. The western projection of Africa and the eastern projection of South America divide the Atlantic into two oceans, the North Atlantic and the South Atlantic.

Size. The Atlantic is a long, narrow ocean with more irregular boundaries than any other great body of water. It has no distinct northern and southern boundaries, therefore various lengths are given it by different geographers. Those who consider the Arctic Circle to form the northern and the Antarctic the southern boundary fix the length as 9,000 miles. More recent authorities, however, divide the Antarctic or Southern Ocean among the Atlantic, Pacific and Indian oceans; this division gives the Atlantic a length of 13,000 miles. Its greatest breadth, between Florida and the Strait of Gibraltar, is 4,150 miles, and, if the Gulf of Mexico be included, 5,000 miles. Between Greenland and Norway the breadth is 930 miles, and between Cape Saint Roque, South America, and Sierra Leone, Africa, it is about 1,800 miles. Between New York and Liverpool it is about 3,200 miles.

Including coast waters the area is about 41,000,000 square miles. It covers over one-fifth of the earth's surface and includes three-tenths of the water surface of the globe. The Pacific Ocean alone is larger.

The Ocean Bed. The bed of the Atlantic is divided into two valleys by a ridge extending lengthwise, each of which is about 500 miles wide. This ridge is nearly parallel with the coast lines and is shaped somewhat like the letter S. The eastern valley varies in depth

from 14,000 to 15,000 feet, and the western from 13,000 to 16,800. North of the Azores Islands the bottom of the ocean gradually rises and forms a plateau whose length extends from the Hebrides to Newfoundland. This is sometimes known as the telegraph plateau, because the Atlantic Cable is laid on it. Along this plateau and over the ridge separating the valleys the ocean has a depth of 9,000 to 10,000 feet. The greatest depth, 27,360 feet, is north of Porto Rico; east of Newfoundland a depth of 20,000 feet has been found, and in the South Atlantic there are depths of 20,000 to 24,000 feet. These are not as great as some depths in the Pacific Ocean, where telegraph cables have been laid six miles below the surface (see CABLE, SUBMARINE).

Shore Lines and Coast Waters. The eastern shore line has a length of 32,000 miles; the western, 55,000 miles. The coasts of Europe and North America are very irregular, but those of Africa and South America contain few

EXTENT OF ATLANTIC OCEAN

indentations. The coast waters on the east are the North Sea, Baltic Sea, Bay of Biscay and the Mediterranean and Black seas, the latter over 2,500 miles inland. On the west they include Hudson Bay, the Gulf of Saint Lawrence, Gulf of Mexico and Caribbean Sea. The most important islands in the North Atlantic are the British Isles, the Canaries, Iceland, Greenland, Newfoundland, the West Indies, the Azores and Cape Verde Islands. The islands of the South Atlantic are comparatively unimportant.

Temperature. The temperature at the surface varies from about 80° F. in the tropical

Outline and Questions on the Atlantic Ocean

I. Location and Size

(1) Boundaries
(2) Length, 13,000 miles, including Antarctic Ocean
(3) Average width, 3,000 miles
(4) Greatest width, 5,000 miles
(5) Area, including coast waters, 41,000,000 square miles

II. Shore Line and Coast Waters

(1) Coasts of northern part irregular
(2) Length of shore
  (a) Eastern, 32,000
  (b) Western, 55,000
(3) Coast waters
(4) Islands

III. Ocean Bed

(1) Two parallel valleys
(2) Telegraph plateau
(3) Varying depths

IV. Temperature and Currents

(1) Temperature at surface
(2) Temperature at bottom
(3) Gulf Stream
(4) Labrador Current
(5) South Atlantic currents

V. Life

(1) Source of food supply
  (a) Fisheries
(2) Smaller forms

Questions

If the highest mountain of North America were placed at the deepest point in the Atlantic Ocean, would its top show above the water?

How does the ocean compare with other great bodies of water as regards regularity of outline?

Does the temperature of the ocean vary according to depth as the temperature of air varies according to altitude?

How large a proportion of the land surface of the globe could the Atlantic Ocean contain?

Why is the western coast of Europe warmer than the eastern coast of North America in the same latitude?

From what is the name of this ocean derived?

What is the "telegraph plateau," and why is it so named?

About how many square miles of water surface are there on the globe?

How does the Labrador Current work damage to navigation?

regions to 28° F. on the borders of the Arctic Ocean. In the tropical regions the temperature falls rapidly for the first 1,500 feet of descent, but below that depth the change is less rapid. The water on the bottom of the ocean is near the freezing point, and changes but little.

Currents. The North and South Atlantic each has a system of marine currents, or rivers in the ocean. In the North Atlantic the most noted of these is the Gulf Stream (which see), which carries the warm water from the tropical regions northward and then eastward, making the western coast of Europe much warmer than the eastern coast of North America in the same latitude. Flowing southward between the Gulf Stream and the coast is the Labrador Current, a cold water stream which brings many icebergs into the warmer regions where they melt and disappear, but in the meantime they are a great menace to navigation (see ICEBERG). The system in the South Atlantic is similar to that in the North Atlantic (see OCEAN CURRENTS).

Life. The Atlantic Ocean is one of the greatest sources of food supply in the world. Most of the fish supplied to the nations of Europe and America are taken from the Atlantic, and the most important of these are the herring and the cod. The most extensive fishing grounds are on and near the Grand Banks, off Newfoundland, and the Dodder Banks, in the North Sea. To the fish taken in such large quantities from these sources must be added the tons of oysters and other shell fish and the fish caught in the innumerable branches of the ocean. Sponges are obtained off the coast of Florida and in the Mediterranean, and the tropical seas are filled with millions of minute creatures, which, while they do not add anything to supply man's needs, beautify the sea by the phosphorescent light which they emit. In the greatest depths giant fish hitherto unknown are being discovered. See OCEAN; TIDES; WAVES. W.F.R.

ATLAN'TIS, an island which, according to ancient tradition, existed in the Atlantic Ocean near the Pillars of Hercules (Strait of Gibraltar). Plato wrote of it, declaring that it had been the home of a great nation but had finally been swallowed up by the sea. Some investigators believe that at the earliest dawn of tradition there may have been such an island, but others regard the whole legend as the outgrowth of some pre-historic discovery of the New World.

AT'LAS, in the mythology of the ancient Greeks, a Titan whom Zeus condemned to bear the heavens on his shoulders. Through the centuries he stood, almost fainting with weariness, until Perseus came by, bearing the head of the Gorgon, Medusa, which turned all who looked upon it into stone. At Atlas' request, Perseus held up the head, and the giant was changed into the mountains which bear his name. When the earliest collection of maps appeared it bore on its title-page the picture of Atlas bending under the weight of the earth, and such books have therefore been called atlases to this day.

THE MYTHICAL ATLAS

ATLAS MOUNTAINS, the name given to the chains of mountains running parallel to the north coast of Africa from Cape Nun on the Atlantic Ocean, across Morocco, Algiers and Tunis to the Gulf of Gabes on the Mediterranean, a distance of 1,500 miles. These ranges are named after Atlas, who, according to ancient mythology, supported on his shoulder the vault of the heavens and dwelt in the mountains. The interesting story is told in the article ATLAS. The mountains are roughly divided into two main parallel chains, running west to east. The inner or Greater Atlas, lying toward the Sahara, is separated by high plateaus from the lower mountains of the Lesser or Maritime Atlas, along the Mediterranean coast. Morocco contains the highest peaks of the system, Jebel Ayashi being 14,600 and Tamjurt 14,500 feet above sea level. The mountains contain many minerals, including silver, antimony, lead, copper and iron. Beautiful marble is found in many parts of the ranges. The vegetation of the northern and higher regions resembles that of Europe, but the southern slopes, exposed to the hot, dry winds of the Sahara, are generally bare and sandy.

ATMOSPHERE, *at' mos feer.* See AIR.

ATMOSPHERIC DUST. See DUST, ATMOSPHERIC.

ATOLL, *a toll'* or *at' ol,* a picturesque coral island common in the Pacific Ocean, consisting of a circular strip or ring of coral inclosing a shallow pool or lagoon. The reef usually has a thin covering of soil in which grow palm and breadfruit trees. In many cases the edges of a submerged volcanic crater supply the base of the structure. The circle of the atoll is usually broken on the side of the prevailing

AN ATOLL

The first illustration presents the surface appearance; the second, a cross-section showing usual depth and form of walls.

winds, so the lagoon has an opening into the surrounding sea. See CORAL.

ATOM, *at' um,* in chemistry, the name given to the smallest particles into which elements are divided by chemical reactions. The smallest particle of any substance is called a *molecule* (which see). If the substance is an element its molecule may consist of one, two or a larger number of similar atoms. If it is a compound its molecule will consist of two or more atoms —one atom at least of each of the elements of which the compound is composed. An example will make this clear. The smallest possible particle of water is a molecule of water. As *water,* it cannot further be subdivided, but that molecule contains two elements, neither of which is water, namely, hydrogen and oxygen. If these two could be combined in the smallest possible quantities, two atoms of hydrogen with one of oxygen, the product would be one molecule of water.

Actually, we cannot see, handle or experiment with single molecules or atoms, but the behavior of substances in larger quantities has led to the theory that all substances are really made up of minute molecules—far too small to be seen even with a microscope—and that these molecules (with the exception of a few, such as those of mercury, zinc and argon) are further subdivided into atoms in undergoing chemical changes such as that by which water is formed from hydrogen and oxygen.

The molecules of hydrogen consist of two hydrogen atoms each; those of oxygen of two oxygen atoms each. Equal volumes of hydrogen and oxygen are believed to contain equal numbers of molecules. When we mix two volumes of hydrogen with one volume of oxygen and explode the mixture, both gases are completely used up and only water is left. It is inferred that each of the oxygen molecules separates into two atoms and that each of these atoms combines with a molecule (or two atoms) of hydrogen to make a molecule of water. The change which we can observe (the disappearance of the gases and the formation of the water) is believed to consist of millions and millions of these little atomic transactions all going on at the same time. See ATOMIC THEORY; ATOMIC WEIGHTS; CHEMISTRY.

The word *atom* is derived from two Greek words signifying *not divisible.* In ordinary chemical actions the atoms are not divided, but the facts discovered in connection with the study of *radioactivity* have led to the conclusion that the chemical atoms are really complex systems of smaller particles or of positive and negative electrical charges. J.F.S.

ATOMIC, *a tom' ik,* **THEORY.** In the early part of the nineteenth century, John Dalton, the English chemist who laid the foundation of theoretical chemistry, proposed a theory to explain the laws of chemical action. This hypothesis, known as the *atomic theory,* assumes first that all chemical elements and compounds consist of tiny particles, or *atoms;* secondly, the atoms of the same element have the same weight; thirdly, the atoms of different elements have different weights; fourthly, chemical action is due to the union or separation of the atoms of the elements.

A number of laws have been discovered governing chemical reaction. According to one law, the elements forming any substance are always present in the same proportion by weight. Again, when one element, such as nitrogen, unites with another element, oxygen, in several proportions by weight, yielding different compounds, the different proportions of oxygen united with one part of nitrogen are simple multiples of a common factor. All the proportions in which the elements combine with one another can be expressed in terms of a set of numbers, one for each element, and the multiples of those numbers. These numbers are the atomic weights of the elements. See CHEMISTRY; ATOM; ATOMIC WEIGHTS. J.F.S.

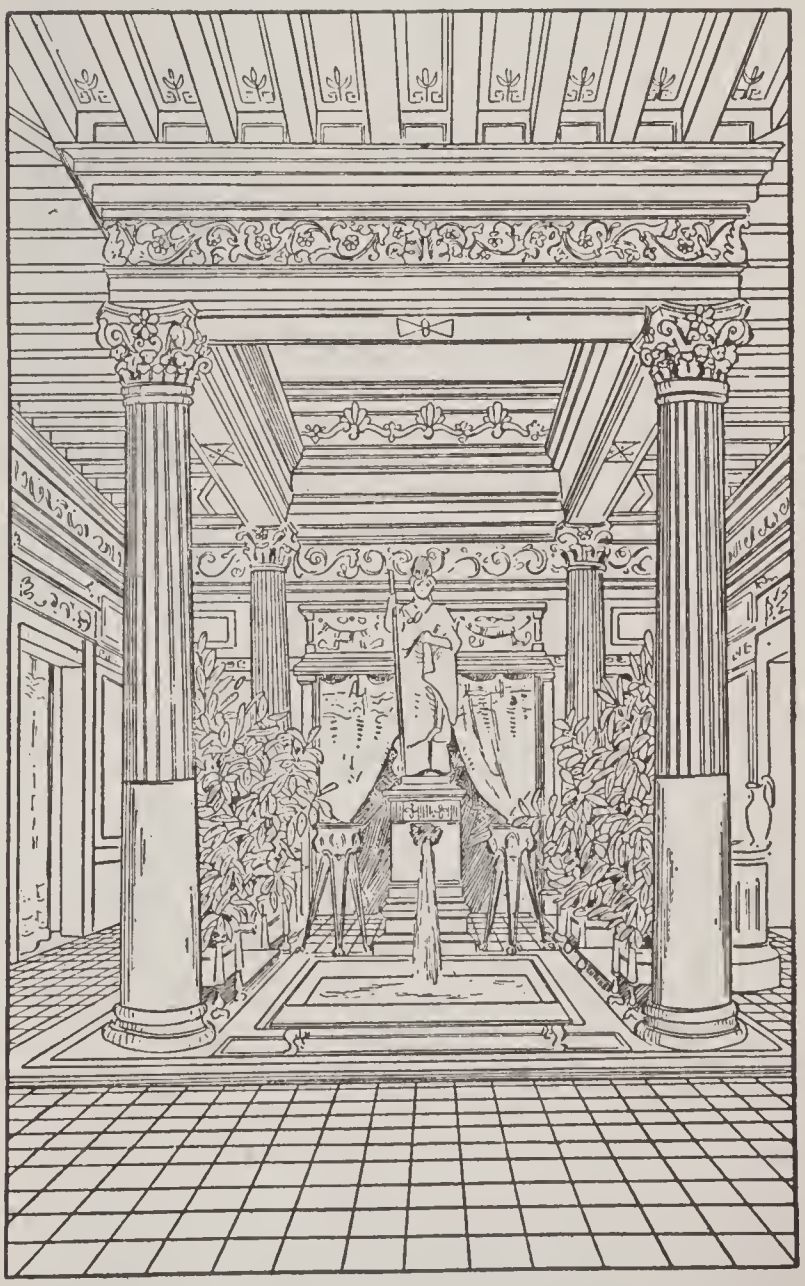
ATOMIC WEIGHTS. The atoms of any chemical element have a different weight from those of any other element. It is, of course, impossible to weigh atoms individually. A number of different kinds of physical experiments, however—some with radioactive elements, some with electricity and some with the microscope—lead consistently to the conclusion that the smallest atoms, those of hydrogen, weigh 16.6×10^{-25} grams each. In other words, it would take 6 million million million million hydrogen atoms to weigh a gram (1/454 of a pound). When a chemist speaks of atomic weights, however, he means only the relative weights of the atoms; that is, how many times heavier one kind of atom is than another. He infers these relative weights from his assumption that every chemical action conducted on a sufficiently large scale to enable him to weigh the reagents and their products is really made up of millions of little reactions among the individual atoms.

For example, he finds that one gram of hydrogen combines with 7.94 grams of oxygen. From this he infers that an atom of oxygen must weigh 7.94 times as much as an atom of hydrogen, or twice 7.94 times as much, or three times 7.94 times as much, or some other whole number of times 7.94 times as much. There are various ways of deciding which of these possibilities is correct. (For these see books on chemistry.) In this instance twice 7.94=15.88 is chosen. If, then, the weight of a hydrogen atom (the highest of all atoms) be taken as the unit, the atomic weight of oxygen is 15.88. A majority of modern chemists, however, prefer to make oxygen the basis of the system of atomic weights, rather than hydrogen. They take exactly 16 as the atomic weight of oxygen. This makes that of hydrogen 1.008 instead of exactly 1. In the table of elements given under CHEMISTRY, the atomic weights are upon this basis. Except hydrogen, helium is the element of lowest weight, 4.0. Uranium has the highest atomic weight, 238.5; thorium the next highest, 232.4; and radium the next, 226. See ATOM; ATOMIC THEORY. J.F.S.

ATONEMENT, *a tohn' ment,* the act of making *as one,* or reconciling those who have been separated because of acts of offense or strong differences of opinion. Atonement means reconciliation. This act may consist of an offering, such as a present, or an apology, or a plea for forgiveness.

While this word is sometimes used in connection with the relations of men in every-day life, it is generally used in a religious sense to express one's relation to God. The system of sacrifice established by Moses and described in the first sixteen chapters of Leviticus shows very clearly that these sacrifices were made to secure reconciliation of the people with God The sacrifice was an atonement for sin of the person offering it and the great sacrifice made by the high priest on the day of atonement, once a year, was an atonement for the sins of the nation.

Little is said about the atonement in the New Testament, but Roman Catholics and Protestants alike agree that Christ, through his death, became the atonement for the sins of the world, and that all men can obtain forgiveness of their sins by believing in Him. There is, however, considerable difference of opinion among religious sects as to the method by which the forgiveness may be secured. See SCAPEGOAT.



ATRIUM

Type of atrium in the homes of wealthy Romans.

ATRIUM, *ay' tri um,* in the earliest Roman houses, the room in which the family life was centered; in later times the general reception

hall. The atrium in the primitive Roman home was a living room where the family cooked, dined, slept and received visitors. Here also were the hearth and the household gods beside it (see LARES AND PENATES), the relics of the ancestors, and the family altar.

The atria in the homes of the wealthy Romans of the time of Augustus and later were beautiful apartments adorned with paintings, statuary, vases and fountains, and having four columns around the central opening to support the roof. In the houses of Pompeii may be seen atria of all kinds in a good state of preservation.

ATROPHY, *at' ro fi,* a condition of wasting of the human body due to interference with the process of nutrition. It may affect practically every part of the physical organism. A familiar illustration is the shriveled arm or leg which has been deprived of exercise by paralysis or joint disease, and which has become atrophied because this lack of exercise has interfered with the nutritive function. Any organ of the body which ceases to function tends to become useless. This explains the presence of the blind fishes in the underground rivers of Mammoth Cave, Ky., whose organs of sight, through many years of disuse, have undergone atrophic change. The brains of imbeciles frequently become shriveled, and this condition might be the fate of a person of normal intelligence who was placed in solitary confinement for a long period without any occupation. Sometimes the pressure of tumors or other growths upon internal organs causes the latter to become atrophied. An affection of the muscular system, known as *progressive musclar atrophy,* is characterized by atrophy of certain muscles or groups of muscles. The disease is associated with the anterior roots of the nerves of the spinal cord. Paralysis of the affected muscles occurs in the course of the ailment. In nearly all cases the disease terminates fatally. W.A.E.

ATTACHÉ, *at ta shay',* a term applied to a subordinate official attached to an embassy. The duties of such an office are specific. A military attaché handles military affairs; a naval attaché, naval business; and a commercial attaché may be sent to an embassy for the purpose of studying commercial conditions.

ATTACHMENT, *at tach' ment,* a term in law applied to a court writ for seizing a person or the property of one sought for court action. A writ of attachment against persons is now issued only for contempt of court. The original purpose of the writ was to secure the appearance in court of one who had disregarded a legal summons. The grounds upon which a writ for attachment of property may be obtained vary under different laws, but usually it is issued to a creditor. It is a harsh and extraordinary measure, used only in cases where the debtor is a non-resident or has left the state with the intention of defrauding the creditor. An attachment is dissolved by final judgment.

ATTAINDER, *a tayn' der.* According to old English law a person who was sentenced to death or outlawed forfeited all rights to his property, including land and personal property, and suffered also *corruption of blood,* which prohibited him from inheriting property or transmitting it to his heirs. Such a loss of civil rights is known as *attainder.* By act of Parliament, passed in 1870, attainder in England was abolished, and it is now obsolete in practically all civilized countries. In the United States a man may be attained for the crime of treason, but the Constitution expressly states that his punishment cannot extend beyond his life. His property passes on his death to his heirs, against whom no penalties can be laid. See BILL OF ATTAINDER.

ATTAR, *at' ar,* a general term for perfume made from flowers, but used most commonly in connection with *attar,* or *otto, of roses,* the rare and costly oil obtained from the petals of several species of roses which are products of the East. Attar of roses is made chiefly in Syria, Persia, India, Turkey and Bulgaria. To obtain the oil the rose petals are distilled with about twice their weight of water, the mixture being placed in open vessels and exposed to the night air. In the morning the thin film of attar which has formed is skimmed off with a feather. The amount of attar obtained from a given number of roses weighs only 1-3000 as much as the whole quantity of petals, yet so powerful is the scent of this oil that one drop will give fragrance to a gallon of cologne.

Various perfumes, including milk of roses and lavender water, are scented with attar, and it is sometimes added to medicines and ointments. A hair oil commonly sold under the name of attar of roses consists of olive oil, coloring matter, and a few drops of attar. This costly oil is often adulterated with sandalwood oil, geranium oil and other substances, and importers sometimes send spies to the factories where it is made, so that they may

know whether or not they are obtaining the pure article. In the United States retailers place attar of roses on the market in small slender bottles containing only three or four drops, and the price of this amount is usually one dollar.

ATTENTION, *a ten' shun,* is the fixing of the mind upon some object or thought for a definite purpose. Sometimes the purpose is immediate, as when we give attention to an object for the purpose of learning what the object is; sometimes it is remote, as when the pupil in school gives his attention to a lesson, as in grammar, that in time he may be able to use the English language correctly. Attention is always present in a state of consciousness; that is, when we are awake we always attend to something. We often say that a child is inattentive. What we really mean is that he is not giving attention to the subject in hand. His attention is where his interest lies.

The best of modern authorities recognize three phases of attention to which they have given different names, such as *non-voluntary, voluntary* and *acquired,* or *passive, active* and *secondary passive.* Whatever the terms used in describing these phases, the meaning is the same.

Passive Attention. Passive or non-voluntary attention is that phase of attention which requires no effort on the part of the individual. Loud sounds, bright lights, peculiar odors force themselves upon us, as it were, without any effort on our part. Again, the child's attention primarily is directed by those external objects which make the strongest impression upon his mind through the special senses. He is attracted by a bright flower, the flitting of a butterfly, the song of a bird, the rippling of the brook or any other object which makes an impression through the avenues of the special sense; but there is no definite purpose in it all.

Active Attention. Active or voluntary attention is directed by the will for a definite purpose. The purpose is more or less remote, but it is the ultimate good upon which the attention is fixed, and between the present status of the individual and that goal there may be many long steps, each requiring special attention before the succeeding step can be taken. In such a case each step becomes a goal leading to the ultimate end. To illustrate: A boy is promised that he may go to a circus that is to exhibit in the neighborhood in two weeks, provided he will finish certain tasks. He gives his attention to his work not merely for the sake of completing the tasks, but because of what to him seems the greater, but more remote, good, the privilege of going to the circus. The ultimate end makes a strong appeal, and he works with a will to secure it. Were school tasks made equally attractive pupils would work at their lessons with equal zeal.

Passive attention merges into active attention so easily that we often fail to recognize the change. Just as soon as we begin to give our attention to an object which was forced upon us for the purpose of gratifying our curiosity about it, our attention has become active. Passive attention is, therefore, in children, and frequently in adults, the first step towards active attention. Passive attention is characteristic of the young child; active attention of the adult.

Secondary Passive Attention. Secondary passive attention, or acquired attention, differs from active attention only in degree. It may best be illustrated by the condition in which a man finds himself when he begins a new occupation or takes a position which places him amid unfamiliar surroundings. At first there are so many strange sights and sounds that intrude themselves upon his consciousness that it is with the greatest difficulty that he can hold his mind upon the work before him. In course of time, however, the new becomes commonplace. Each day his task becomes easier, until in a few weeks he finds that it requires little or no effort to keep his mind upon his work. In other words, *he has formed the habit of attending to his work.* But *he has formed it by effort.*

Place of Attention in Education. Attention is the first step in gaining knowledge. Joseph Cook said, "Interest is the mother of attention, and attention is the mother of knowledge. If you would win the daughter, be sure of the mother and grandmother." Sir Isaac Newton said that he was able to accomplish what others failed to do because he could hold his attention upon a problem for a longer time than they could. Training in attention is essential to a well-disciplined mind.

Attention grows with the development of the mind. It is stronger in the adult than in the child. It is a selective activity; whatever ideas are in our minds are there because at some time in life we chose to put them there. Attention can be fixed only upon those objects and ideas that have some meaning, that is, which point to something big in themselves.

Outline and Questions on Attention

I. Definition

(1) The act
(2) The purpose

II. Phases

(1) Passive or non-voluntary
  (a) Without effort
  (b) Without purpose
  (c) First step toward active attention
  (d) Characteristic of the child
(2) Active or voluntary
  (a) Directed by will
  (b) Definite purpose
  (c) Characteristic of adult
(3) Secondary passive or acquired
  (a) Difference from active one of degree
  (b) Effort required
  (c) Cultivation of habit

III. Importance in Education

(1) First step to knowledge
(2) Grows with practice
(3) Selective nature
(4) Importance of relaxation

Questions

When a teacher says, "This is the most inattentive child in the class," what does she really mean?

If your eye is unconsciously caught by a brilliantly lighted sign and you stop to discover what the sign says, what process has taken place?

Is it wise to expect a child to solve his arithmetic problems just before he goes to bed? Why?

Can you at any time actually be attentive to nothing?

Can a person who has never learned to hold his attention fixed on one idea be considered well-educated?

Why can you not fix your attention for a half hour upon the fact that "Two times two are four"?

What is the difference between active and secondary passive attention?

What sort of attention is it that registers the sound of a revolver shot?

How can a young person determine the sort of things which shall claim his attention when he grows older?

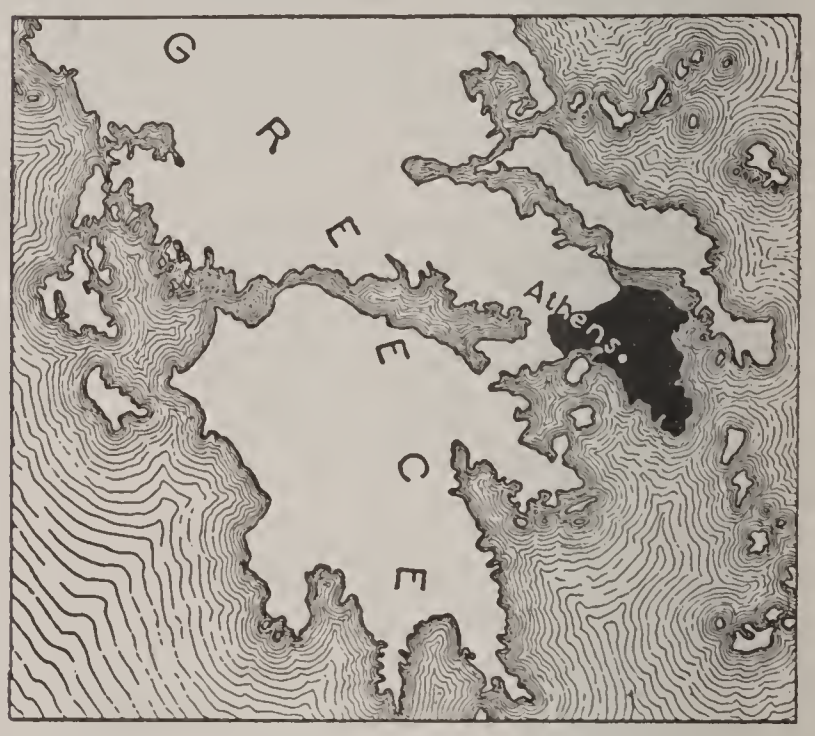
What did Joseph Cook call the "grandmother of knowledge"?

Why is it difficult to do as much and as good work as usual amid new surroundings?

Attention can be held only for a short time upon an object that does not change. In the acquisition of knowledge the mind is active; it requires that the material upon which it works should be active also.

Attention causes fatigue, hence it becomes weakened when exercised for a long time. It is usually weaker toward the close of the day than in the morning. In the training of children periods requiring active attention should be followed by periods of relaxation. W.F.R.

ATTICA, *at' i ka,* a district of Greece on the extreme southeast coast, celebrated as the home of the ancient Athenians, through whose genius Grecian art, literature and philosophy reached their greatest heights. Attica is a triangular



ATTICA
Location of the district, both in ancient and modern times.

peninsula jutting into the Aegean Sea, and Athens is its most important city. Its surface is mountainous, the soil is light and thin, and the coast indented by numerous bays and harbors. The early inhabitants had to use the greatest care in the practice of agriculture, which fostered habits of industry, while the coast, with its line of natural harbors, made them a seafaring race and encouraged trade and commerce. The clear air of this region, and the brilliant blue of its skies, praised by poets from ancient times, are said to have been a wonderful inspiration to the Athenians. Milton's lines in this connection are well known:

Where, on the Aegean shore, a city stands,
Built nobly, pure the air, and light the soil—
Athens, the eye of Greece.

Modern Attica is a department of Greece, having a population of about 341,000. See ATHENS; GREECE, subhead *History.*

ATTILA, *at' ti la,* a famous king of the Huns whose merciless treatment of conquered peoples gave him among the Christians of the fifth century the name "Scourge of God." In 434 he became joint ruler with his brother, Bleda, over countless hordes of fierce barbarians in Northern Asia and Europe; ten years later he caused his brother to be put to death. In 447 Attila laid waste all the countries between the Black Sea and the Mediterranean, easily defeated the weak Theodosius II, ruler over the Eastern Roman Empire, and after overrunning Thrace, Macedon and Greece, forced the emperor to grant him territory south of the Danube and to pay him tribute.

Gaul was invaded in 451, but in the famous Battle of Châlons the Huns were completely defeated by the Roman army of the West, commanded by Aëtius and Theodoric, king of the Visigoths. The following year Attila resumed his terrifying work of conquest, and Rome itself was saved only by the personal plea of the saintly Pope Leo I. In 453, on the night of his marriage with the beautiful Hilda (or Ildico), Attila died very suddenly, in the midst of preparations for another invasion of Italy. Whether he died at the hands of a friend of Rome or was killed by the bursting of a blood vessel or murdered by his reluctant bride has never been determined. The description of Attila which has come down to us states that he had a large head, a flat nose, broad shoulders and a short and ill-formed body, but that his eyes were brilliant, his walk stately and that he possessed a voice strong and well-toned.

ATTLEBORO, Mass., a town composed of several small villages in Bristol County, in the southeastern part of the state. Boston is thirty miles northeast and Providence, R. I., is twelve miles southwest. Transportation is provided by the New York, New Haven & Hartford Railway and by electric lines to neighboring cities. Attleboro has large bleacheries and dye-houses and gold and silver refineries and smelters. The leading manufactures are jewelry and silverware, but buttons, cotton goods, yarn and leather are also made here. The town has a public library, a state armory, an almshouse and the Attleboro Home Sanitarium. Attleboro was settled in 1669 and was named for the English city of Attleborough. Originally it was a part of Rehoboth, but was incorporated as a separate town in 1694. In 1910 the population was 16,215; in 1920 it was 19,731.

ATTORNEY-GENERAL, *a tur' ni jen er al,* the chief law officer of the United States or of a state. The Attorney-General of the United States is a member of the President's Cabinet, and the head of the Department of Justice. He is the fourth member of the Cabinet in the order of succession to the Presidency. It is his duty to conduct all suits in the Supreme Court in which the United States is concerned, and to advise the President and the members of the Cabinet upon points of law bearing upon matters in their respective departments when he is requested to do so (see Justice, Department of). His salary is $12,000 per year.

The attorney-general of a state occupies a position in the state government similar to that of the Attorney-General of the United States in the national government, except that he is not a member of a Cabinet; he is an independent officer of the state. He conducts cases in the state Supreme Court to which the state is a party, and is the legal adviser of the governor and the heads of departments of the state government.

In Canada both Dominion and provincial attorneys general are Cabinet members.

ATTRACTION, *a trak' shun,* in physics, is the force through which particles of matter belonging to the same system are drawn toward one another. *Gravitation,* whereby the planets are held in their relative positions in the solar system and falling bodies are drawn to the earth, is an example of attractive force which operates universally. Other illustrations of attraction are *cohesion,* the force that holds together like molecules; *adhesion,* the force that holds together unlike molecules; *magnetic attraction,* represented by the pulling up of iron filings when a horseshoe magnet is held near them; and *electrical attraction,* illustrated by the drawing near of a pith ball to an electrified body. See Gravitation; Adhesion; Cohesion; Magnetism; Electricity.

In chemistry, attraction is represented by the force by which the elements in a compound substance are retained in combination. This force, which is known as *chemical affinity,* is illustrated by the union of hydrogen (two parts) and oxygen (one part) to form a molecule of water, whose symbol thus becomes H_2O.

AUBURN, *aw' bern,* Me., one of the most picturesquely situated cities in the state, is noted for its extensive shoe-manufacturing industry. It was founded in 1789, and incorporated in 1869; the population, largely American,

with a mixture of French Canadian, Irish, English, Hebrews, and Germans, numbered 15,064 in 1910 and increased to 16,985 in 1920. The area is about forty-nine square miles.

Auburn is situated in the southwestern part of the state, on the west bank of the Androscoggin River in Androscoggin County, of which it is the county seat. Lewiston, on the opposite bank of the river, is connected with it by four bridges. Augusta is thirty-one miles northeast, and Portland is thirty-five miles south. The Maine Central and Grand Trunk railroads serve the city, and electric lines connect with towns north, east and west. It holds high rank in the shoe-manufacturing industry and its activity is notable in other lines. There are machine shops, canning works, packing houses and manufactures of lumber, marble and cotton products. Abundant water power is supplied by the Androscoggin and Little Androscoggin rivers. In 1920 there were 75 manufacturing establishments, employing $16,000,000 capital, with products worth $28,000,000.

Buildings of interest are the post office, erected in 1908 at a cost of about $65,000, a $40,000 Home for Aged Women, and a high school which cost $100,000.

Points of interest in the vicinity are Lewiston Falls and Poland Springs. Taylor Pond and Lake Auburn are considered among the most beautiful lakes in Maine, and the landscape surrounding Auburn presents one of the most striking views in the state. R.W.S.

AUBURN, N. Y., a manufacturing city, the county seat of Cayuga County. It is also a popular summer resort because of its location in the hill and lake country of the western part of the state. It extends along both sides of the outlet of Owasco Lake, which is two and a half miles south and east of the city. Syracuse is twenty-six miles northeast, and Rochester is seventy-seven miles northwest. It is on the New York Central, the Lehigh Valley and the New York, Auburn & Lansing railroads and two interurban lines. In 1910 there were 34,668 inhabitants; in 1920 the number had increased to 36,142. The area of the city is nine square miles.

Auburn Theological Seminary, a Presbyterian school incorporated in 1820, and a branch of the Woman's Educational and Industrial Union are situated in Auburn. The city also contains the state armory and the state prison, in connection with which there is a women's prison. Prominent buildings are the Federal building, city hall, Case Memorial building, which contains the Seymour Library, an auditorium and the county courthouse. The city has a number of parks, athletic fields and free playgrounds.

An abundance of water for domestic and manufacturing purposes is supplied by Owasco Lake. Auburn is the home of about 200 diversified industries, employing nearly 7,000 workers whose pay amounts to $3,000,000 annually. The most important industrial enterprises are manufactories of cordage and twine, agricultural implements, boots and shoes, carpets and rugs, pianos, engines, rubber goods, flour and machinery. The city owns and operates a number of grey and blue limestone quarries in the vicinity.

Auburn, laid out in 1793 by Captain John L. Hardenbergh, a veteran of the War of Independence, was called Hardenbergh's Corner until 1805, when it was made the county seat under its present name. It was incorporated as a village in 1815 and as a city in 1848. After 1823 Auburn was the home of William H. Seward, Secretary of State in Lincoln's Cabinet. He was buried in Fort Hill Cemetery. In the city is a fine bronze statue of this distinguished citizen. A.G.A.

AUCKLAND, *awk' land,* the capital of the New Zealand province of the same name, situated on Waitemata Harbor, one of the finest anchorages in the southern hemisphere. Until 1865, Auckland was the capital of New Zealand, but in that year the more central situation of Wellington was recognized and that city became the seat of government. The domestic and foreign trade of Auckland is extensive. The chief industries are shipbuilding, sugar refining, rope making and glass blowing. Imports consist chiefly of textiles, agricultural implements, machinery, tea and coffee.

Auckland is 5,440 miles from San Francisco, 1,350 miles from Sydney, and about 11,500 miles from Liverpool by the Panama Canal. It is an important port of call for all vessels trading with Australasia. The city is well planned, illuminated throughout by electricity, and has many fine buildings. Population, 1921, 157,757.

AUCTION, *awk' shun,* a form of sale where goods must be offered publicly and must be sold to the person offering the highest price, by public bidding. The owner of the property offered for sale may personally or through an authorized agent make bids on the articles to be sold in order to prevent their being sold for too low a price, but if he should employ

different agents to bid against each other in order to force the price upward, his action would be illegal. Put differently, mock bidding to raise the price by apparent competition is contrary to law. The auctioneer, or person in charge of an auction, may refuse to sell an article if only one bid is received, but upon receiving a second bid the sale must continue. When the final bid on an article has been made, a binding contract for purchase and sale has been made (see CONTRACT).

AUDITOR, *aw' di ter,* an officer whose duty it is to examine accounts. Auditors for the various departments of any government examine the accounts of the officials in their respective departments who receive and pay out money. The auditor for a state or province examines the accounts of the state or provincial treasurer, and in most cases approves all bills before they can be paid. It is also his duty to see that the expenditures for any purpose do not exceed the specified appropriation.

Cities, corporations and smaller firms usually have auditors or they employ such men periodically, who make painstaking examination of all books of record and base thereon a report. An auditor must be an expert bookkeeper and also have a good knowledge of finance. One who has passed state examinations entitling him to rank as a certified public accountant can command a salary of $15 to $30 per day. See ACCOUNTANT.

AUDUBON, *aw' doo bon,* **SOCIETY,** THE, an organization formed for the protection of birds. Beautiful birds have been hunted for their plumage, others for sport, until there has been danger of many species becoming extinct. This association, named for the great bird-lover, John James Audubon, has done much to prevent such wanton destruction and to create a sentiment against the wearing of birds and feathers on millinery. In almost every part of North America societies exist, with a membership totalling scores of thousands, and in addition thousands of women, not enrolled members, have pledged themselves to refrain from wearing any ornaments which require the killing or maiming of birds. Many of the states and provinces have adopted laws which forbid the killing at any time of non-game birds, and it is chiefly due to the Audubon societies that the large tracts of ground have been set apart as bird reservations (which see).

The official organ of the National Association of Audubon Societies is *Bird-Lore,* a magazine which, because of its popular, non-technical character, commends itself to bird-lovers who, strictly speaking, are not bird students. Information as to methods of organizing a society or as to the specific aims of the association may be obtained from National Audubon Societies' headquarters, New York City.

John James Audubon (1780-1851), an American naturalist and bird-lover, who did perhaps more than any other man to interest Americans in their native birds. He was born at Mandeville, La., of French parents, studied in France, and was taught drawing by the great artist David. In 1798 he settled near Philadelphia, where he lived for ten years, devoting himself to the study of birds; later he spent much time in the West, where it was his great pleasure to wander about the woods and watch his feathered friends. In 1826 Audubon went to England, exhibited his drawings of birds, and finally published them in a great work containing 435 colored plates of birds the size of life, entitled *The Birds of America.* A copy of this complete work to-day is worth about $2,000. Later there appeared an accompanying text entitled *Ornithological Biography,* partly written by William McGillivray.

On his return to America Audubon labored with Dr. Bachman on a finely illustrated work entitled *The Quadrupeds of America.* His great merit is the accuracy and extent of his original observations. Audubon never instituted any movement for the preservation of birds, for in his day much of the country was wild and it looked as though there were no danger of the birds ever becoming extinct; but his genuine love for them justifies the naming of the Audubon Society for him.

AUGEAN, *aw je' an,* **STABLES,** in Greek and Roman mythology the stables of King Augeas, which, after thirty years of neglect, were cleansed in a single day. Augeas kept in these stables his famous 3,000 head of oxen. Hercules, commanded to perform twelve great labors as a punishment for having slain his children, was given as his sixth task the cleansing of the stables in one day. This gigantic feat he accomplished by turning into the stalls the Alpheus and Peneus rivers, whose waters entirely washed away the filth that had been collecting for thirty years. At the present time the expression, "cleansing the Augean Stables" is often used in a figurative sense, and is applied to a reformer who

tries by personal labor or by publicity to remedy shameful political conditions. See HERCULES; MYTHOLOGY.

AUGER, *aw' ger,* a tool used for boring wood and earth. For either purpose the implement has a screw at the point, which draws it into the substance; a spiral pod with a cutting lip at each side of the end next to the screw

AUGER

throws out the borings. A steel shank above the pod carries the handle. An auger should be distinguished from a bit. The form of the boring part is the same, but a bit is fitted into a brace or bit stock. See BORING MACHINE.

AUGSBURG, *owgs' boorK,* in Bavaria, a famous free city of the Middle Ages, known as a center of trade between Germany and Italy and for its connection with the Augsburg Confession, the subject of the next article. It is still an important commercial point, with a population of over 100,000.

Augsburg means the *City of Augustus.* It stands on the site of a colony founded by the emperor, about 12 B.C. The town became a free city in 1276. It played an important part in the development of German art, and among its treasures numbers the celebrated Golden Hall, a room in the town hall, considered one of the most beautiful in Germany.

AUGSBURG CONFESSION, the most important statement of their religious beliefs that the Protestants drew up during the Reformation, and at the present time the basis of the Lutheran faith. The Emperor Charles V, hoping to smooth out the difficulties between the Catholic and Protestant parties in Germany, called a meeting, or diet, at Augsburg in 1530 and requested the Protestants at that time to present a statement of their beliefs. Luther was unable to attend the diet, and the confession was therefore drawn up by Philip Melanchthon, one of the great Protestant leaders, and revised by Luther before being read. Charles V and the Catholics would not accept the document, and the division in the Church became permanent. Later, when the English religious leaders drew up the Thirty-nine Articles of the Church of England, they used the Augsburg Confession as a basis for their work. G.W.M.

AUGURS, *aw' gers,* a sacred college among the Romans, whose members read the hidden meaning of various signs and omens, and from them made plain the will of the gods and foretold the future. These omens were signs in the sky, especially thunder and lightning; the flight and cries of birds; the feeding of the sacred chickens; the movements and sounds of serpents and other animals; and chance happenings, such as the gnawing of a mouse or the creaking of a chair, which occurred before or during the augural ceremony. (See SUPERSTITION and its allied subjects.)

The augurs were consulted when anything of importance was undertaken, and they could dismiss a meeting of the people merely by saying *alio die* (on another day). In early times, when the college was composed of nobles, the augurs sometimes used their power unjustly to keep the plebeians from holding a meeting. This college at first consisted of three members, but this number had increased to sixteen by the time of Caesar. The augurs were always men of distinction, and wore the toga with the wide purple border (see TOGA).

In modern speech *augur* and *augury* are used in the sense of *foretelling* or *anticipating,* and often with an impersonal subject, as, "It *augurs* ill for our plans that we cannot all agree."

AUGUST was named for the Roman Emperor Augustus, one of the greatest rulers that ever lived; and there is indeed something royal about it. It is a month of gold and purple—its sun throws a "golden glory" on the yellowing fields, and everywhere there is golden rod and the purple aster; while purple grapes hang ripening on the vines. It is one of the warmest months of the year in the northern hemisphere, and usually one of the

AUGUST CALENDAR

Birthdays

1. Richard Henry Dana, 1815
2. F. Marion Crawford, 1854
   Duncan Campbell Scott, 1862
4. Percy Bysshe Shelley, 1792
6. Alfred Tennyson, 1809
   Lord Strathcona and Mount Royal, 1820
8. Nelson A. Miles, 1839
9. Izaak Walton, 1593
   Francis Scott Key, 1780
12. Robert Southey, 1774
13. Goldwin Smith, 1823
14. Sir James Douglas, 1803
    Ernest Thompson Seton, 1860
15. Napoleon Bonaparte, 1769
    Sir Walter Scott, 1771
    Thomas De Quincey, 1785
17. David Crockett, 1786
18. Virginia Dare, 1587
    Meriwether Lewis, 1774
19. James Nasmyth, 1808
20. Benjamin Harrison, 1833
22. John B. Gough, 1817
24. William Wilberforce, 1859
25. Francis Bret Harte, 1839
26. Sir Robert Walpole, 1676
28. Sir Edward Burne-Jones, 1833
29. John Locke, 1632
    Oliver Wendell Holmes, 1809
31. Elizabeth Stuart Phelps, 1844

History

1. Columbus first landed on American continent, 1502
   Battle of the Nile, 1798
   Colorado admitted to the Union, 1876
   Germany declared war on Russia, 1914
2. Henry Hudson first entered Hudson Bay, 1610
   German invasion of Belgium begun, 1914
3. Columbus sailed from Spain on his first voyage, 1492
   United States vessels bombarded Tripoli, 1804
4. All titles of nobility abolished in France, 1789
   Chinese exclusion law went into operation in United States, 1882
   Cardinal Sarto elected Pope as Pius X, 1903
5. Sir Humphrey Gilbert landed at Saint Johns, Newfoundland, 1583
   First partition of Poland, 1772
   England declared war against Germany, 1914
6. Holy Roman Empire ceased to exist, 1806
7. Battle of Thermopylae, 480 B. C.
   British entered Lhassa, Tibet, 1904
8. Bonaparte sailed from England for Saint Helena, a prisoner, 1815.
9. Webster-Ashburton Treaty signed at Washington, 1842
   Edward VII of England crowned, 1902
10. Missouri admitted to the Union, 1821
    Russian and Japanese peace commissioners met at Portsmouth, N. H., 1905
11. Fulton's *Clermont* made a trial trip, 1807
    Settlement of boundary between Ontario and Manitoba, 1884
12. First American railway joined Schenectady and Albany, N. Y., 1830
    United States and Spain signed peace proposals, 1898
    France and England declared war on Austria, 1914
13. Mexico City captured by Spaniards, 1520
    Manila surrendered to United States, 1898
    Norway voted for separation from Sweden, 1905
14. Foreign armies entered Peking to relieve legations, 1900
15. Fort Dearborn massacre, 1812
    Lafayette returned to visit America, 1824
16. Battle of Bennington, 1777
    General Brock captured Detroit, 1812
18. Kearney took Santa Fe, New Mexico, 1846
19. *Guerrière* surrendered to the *Constitution*, 1812
    Parliament passed bill for Union of South Africa, 1909
    Battle of Lorraine began, 1914
20. Pilgrims sailed from England on *Mayflower*, 1620
21. Lincoln-Douglas debates began, 1858
22. Battle of Bosworth, 1485
23. Germans began attack on Mons, France, 1914
24. Massacre of Saint Bartholomew, 1572
    British took Washington, D. C., and burned the Capitol, 1814
25. Two hundred inhabitants of Montreal killed by Iroquois Indians, 1689
27. English captured Fort Frontenac, Canada, 1758
    Battle of Long Island, 1776
    Louvain burned by Germans, 1914
28. British Parliament abolished slavery in the colonies, 1833.
    Montenegro proclaimed an independent kingdom, 1910
29. Melbourne, Victoria, founded, 1835
30. Massacre of Fort Mims, 1813
    Second Battle of Bull Run, 1862
31. Earthquake at Charleston, S. C., 1886

For Study

Butterfly
Caterpillar
Lily
Molting
Poppy
Pewee
Rice
Seed dispersal
Wheat
Thistle
Summer heavens (see ASTRONOMY)
Vireo

AUGUST QUOTATIONS

1. All the long August afternoon,
The little drowsy stream
Whispers a melancholy tune
As if it dreamed of June,
And whispered in its dream.
Howells.

2. But pleasures are like poppies spread,
You seize the flow'r, its bloom is dead.
Burns.

3. And ye shall succor men;
'Tis nobleness to serve:
Help them who cannot help again.
Emerson.

4. Music, when soft voices die,
Vibrates in the memory. *Shelley.*

5. Be strong!
It matters not how deep entrenched the wrong;
How hard the battle goes, the day how long;
Faint not—fight on.
To-morrow comes the song. *Babcock.*

6. The sixth was August, being rich arrayed
In garment all of gold down to the ground. *Judd.*

7. Not in the clamor of the crowded street,
Not in the shouts and plaudits of the throng,
But in ourselves are triumph and defeat. *Longfellow.*

8. The simple faith remains that He
Will do, whatever that may be
The best alike for man and tree.
Whittier.

9. Sweet is pleasure after pain.
Dryden.

10. In the parching August wind,
Cornfields bow the head,
Sheltered in round valley depths,
On low hills outspread. *Rossetti.*

11. Nor knowest thou what argument
Thy life to thy neighbor's creed hath lent. *Emerson.*

12. The dew is gleaming in the grass,
The morning hours are seven,
And I am fain to watch you pass,
Ye soft white clouds of heaven.
Lampson.

13. The August cloud * * * suddenly
Melts into streams of rain. *Bryant.*

14. Not what we give, but what we share,
For the gift without the giver is bare;
Who gives himself with his alms feeds three—
Himself, his hungering neighbor, and me. *Lowell.*

15. The word *impossible* is not in my dictionary. *Napoleon.*

16. The bravest are the tenderest,
The loving are the daring. *Taylor.*

17. What I kept, I lost.
What I spent, I had.
What I gave, I have.
Persian Proverb.

18. They can conquer who believe they can. *Emerson.*

19. In the first drowsy heat of August noon—
Comes the plumed golden rod with flaunting train,
And lifts her yollow head along the way. *Judd.*

20. Dream not helm and harness
The sign of valor true;
Peace hath higher tests of manhood
Than battle ever knew. *Whittier.*

21. Whether we climb, whether we plod,
Space for our task the scant years lend—
To choose some path that leads to God
And keep it to the end. *Reese.*

22. The brilliant poppy flaunts her head
Amidst the ripening grain,
And adds her voice to swell the song
That August's here again.
Winslow.

23. Why, courage then! what cannot be avoided
'Twere childish weakness to lament or fear. *Shakespeare.*

24. In the world's broad field of battle,
In the bivouac of life,
Be not like dumb, driven cattle—
Be a hero in the strife. *Longfellow.*

25. Through all the long midsummer day
The meadow-sides are sweet with hay.
Trowbridge.

26. Small service is true service while it lasts—
The daisy, by the shadow that it casts,
Protects the lingering dewdrop from the sun. *Wordsworth.*

27. The sun has drunk
The dew that lay upon the morning grass;
There is no rustling in the lofty elm
That canopies my dwelling, and its shade
Scarce cools me. *Bryant.*

28. They serve God well
Who serve his creatures. *Norton.*

29. Sin has many tools, but a lie is the handle which fits them all.
Holmes.

30. I dare do all that may become a man;
Who dares do more is none.
Shakespeare.

31. How beautiful is the rain!
After the dust and heat,
In the broad and fiery street,
In the narrow lane,
How beautiful is the rain!
Longfellow.

stillest, so its heat is likely to be the "sweltering" variety. Its special flower is the poppy, and its gem the sardonyx.

History of the Month. In Rome, during the days of the Republic, the year began with March, and August was the sixth month, as its name, *Sextilis,* declares. But after Julius Caesar made his reforms in the calendar it became the eighth month (see CALENDAR). This alone would not have led to its renaming, but Julius Caesar rechristened the month of July for himself, and his successor Augustus, desired a like honor. Requested to make his choice, he took his "lucky month"—the month in which he had been elected consul, had three times celebrated a triumph, and had completed the conquest of Egypt. But here a difficulty arose: July had thirty-one days, and the newly-named month had but thirty; and thus Julius was yet more honored than Augustus. Since this was not to be thought of, a day was taken from February, already the least of the months, and given to August.

In the United States, as in Canada, there is no general holiday in August, but several of the states have set special days apart for observance. Colorado celebrates the first of August, the date of its admission to the Union, and Missouri the tenth, for a similar reason; while Vermont observes with fitting ceremonies the sixteenth, the anniversary of the Battle of Bennington.

AUGUSTA, *aw' gus ta,* GA., locally known as the *Queen City,* is the largest cotton manufacturing center of the South, and second largest inland cotton market in the world. It had a population, chiefly American, of 52,548 in 1920, an increase of 11,508 since 1910. The city is located 140 feet above sea level, on the Savannah River, in Richmond County, of which it is the county seat, in the northeastern part of the state. Charleston, S. C., is about 136 miles southeast; Atlanta, about 171 miles northwest. Transportation facilities are afforded by the Georgia, Central of Georgia, Southern, Augusta Southern, Charleston & Western Carolina, Atlantic Coast Line and Georgia & Florida railways, and by steamer, the river being navigable to Augusta. The area is about nine square miles.

Buildings. Among the structures of note are the post office, erected at a cost of $350,000, a fine courthouse, the $450,000 Empire building, and a granite bank building constructed in 1913. The most prominent of its educational institutions are the Richmond Academy, one of the oldest academies in the south, Mount Saint Joseph Academy and the Medical College of Georgia, founded in 1832. Paine Institute (colored), three business schools, two high schools and two public libraries also serve the educational needs. The most notable of its many churches is Saint Paul's, which was the only church for fifty years in Augusta.

Commerce and Enterprise. Augusta is located in the heart of the cotton district, and its industries largely center in the manufactures of this product. It supplies a larger quantity of unbleached cotton goods than any other city of the United States and the number of its cotton factories has given it the name of the *Lowell of the South.* It is also the second largest cottonseed oil market in the world. The Augusta Canal, nine miles long, constructed at a cost of $1,500,000, furnishes abundant power for manufacturing purposes. It was near Augusta that the first cotton-gin was invented and operated by Eli Whitney, and here the first steam-propelled boat was floated by James Longstreet in 1806, a year before the Fulton exploits were known. It is also claimed that a sewing machine was constructed here in 1830, several years previous to the Howe invention. Here also was invented the first burr-cleaning machine and from the noted State Medical College came Dr. Crawford Long, the discoverer of anaesthesia.

History. Augusta was founded in 1736 by General James Oglethorpe, founder of the colony of Georgia, who named it *Augusta* in honor of the daughter of George II; in 1798 it was incorporated as a city. Before and during the Revolutionary War it was an important military post and the surrounding country was the scene of heroic fighting. Fort Cornwallis and Fort Grierson were located here; General Henry Lee, known in history as "Light Horse Harry," was one of the leaders in the capture of these two forts, which feat drove the English from Augusta. From 1790 to 1796 it was the capital of Georgia. The government maintains an arsenal here for the storage of arms and ammunition. It is the burial place of three of the signers of the Declaration of Independence, Hall, Walton and Guinnett. In March, 1916, the city sustained a loss by fire, amounting to several millions of dollars. M.&M.A.

AUGUSTA, ME., the capital of the state, the county seat of Kennebec County, and a trade center of importance in its territory. It is situated in the southwestern section of the

state, at the head of navigation on the Kennebec River, forty miles from the sea. Portland is sixty-one miles southwest by rail. Railway transportation is by the Maine Central Railway, and the Augusta, Winthrop & Gardiner electric line communicates with adjacent cities and towns. Steamers connect with Portland, Boston and other important coast cities. The permanent settlement of Augusta dates from 1754. The place was known as Cushnoc, until 1771, when it was incorporated as Hallowell; a part of this settlement was organized as Harrington in 1797, the name being later changed to Augusta. In 1831 it became the capital of the state and in 1849 it was incorporated as a city. The population increased from 13,211 in 1910 to 14,114 in 1920, French comprising one-fifth of this number. Fifty-five and one-half square miles are included within the city's limits.

Augusta is built on both banks of the river—mainly on the west bank—a large portion occupying an elevation considerably higher. Here are the residence districts and the massive granite State Capitol with its library of 60,000 volumes. The Federal building, United States arsenal, Maine insane asylum, city hospital and Lithgow Library (public) are other buildings worthy of note. Across the river, one-half mile above Augusta, extends an immense dam nearly 1,000 feet in length, which furnishes great water power for manufacture. The city has big cotton and shoe factories, lumber-pulp and paper mills, and publishing houses. Its 45 factories in 1920 employed $8,000,000 capital, and their product was worth $12,000,000.

AUGUSTAN AGE, the most brilliant period in the history of Roman literature, taking its name from the Emperor Augustus, who generously aided and encouraged the writers that lived in his reign. It was the time of Horace, Ovid, and Vergil, the age which saw the highest development of the Latin language and in which literary men received the highest honors. In England the term was later applied to a corresponding period of great literary activity, the age of Steele, Addison and Swift, and in France to the reign of Louis XIV.

AUGUSTINE, *aw gus' tine,* or **AUSTIN,** SAINT, the *Apostle of the English,* and the first archbishop of Canterbury. While a monk in the monastery of Saint Andrew, Rome, he was summoned by Pope Gregory I to lead a band of missionaries to England. In 597 they landed on the island of Thanet, southeast of England, and were there kindly welcomed by Ethelbert, king of Kent. Through the preaching of Saint Augustine and his followers thousands of the English, including the king, were converted, and in 601 the Pope made Augustine Archbishop of Canterbury. The historian Green says of the mission of Saint Augustine:

> The march of the monks as they chanted their solemn litany was in one sense a return of the Roman legions who withdrew at the trumpet call of Alaric. The civilization, art, letters, which had fled before the sword of the English conquerors, returned with the Christian faith.

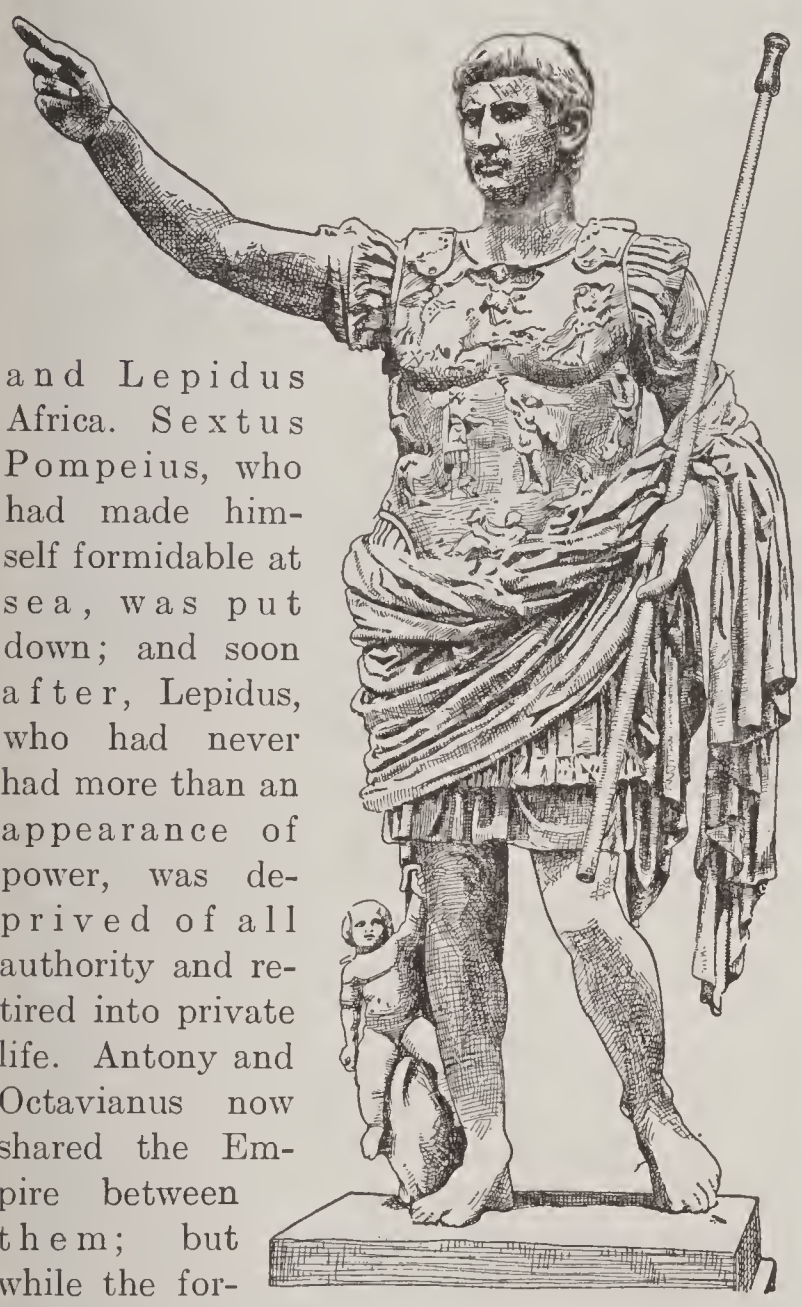
AUGUSTINE, SAINT (AURELIUS AUGUSTINUS) (354-430), a renowned Catholic theologian, ranking first among the great early fathers of the Church in intellectual power, spirituality and influence. He was born at Tagaste, in Numidia, North Africa, and as a youth showed such promise that his father gave him the best education possible at that time. After finishing his schooling at Carthage, he became a teacher of rhetoric and grammar. Though his mother was a Christian and a woman of sincere and tender piety, Augustine did not accept Christianity until thirty-two years of age. From the time he was nineteen he sought eagerly for the truth, taking up one system of philosophy after another, and finding in none the power that could free him from the vicious habits which he had acquired in his boyhood. About 384 he went to Milan to accept a position as teacher of rhetoric, and there, coming under the influence of the great Saint Ambrose, bishop of Milan, was converted to Christianity in 386.

Augustine's conversion is an important event in the history of the Catholic Church, for, having consecrated his mighty intellect to the service of the Church, he produced a great body of writings on theology that have had profound influence from his age to the present time. He became bishop of Hippo (in North Africa) in 395, and labored there until his death, which occurred during the famous siege by the Vandals in the year 430. Two of Augustine's works, *The City of God* and his *Confessions,* are to be classed among the best-known religious writings of all time. The former is a defense of Christianity and the Christian Church; the latter, a narrative of his early life and conversion, reveals the heights of his literary power.

AUGUSTUS, a title meaning *consecrated,* bestowed by the Roman Senate upon Gaius Julius Caesar Octavianus (63 B. C.-A. D. 14), one of the most famous rulers who ever lived. He

was a grand-nephew of Julius Caesar, by whom he was adopted, and was studying in Illyricum at the time of Caesar's assassination. Proceeding to Rome to claim his uncle's property and avenge his death, he came into conflict with Antony, but the latter was overcome and Octavianus succeeded in getting himself chosen consul. Soon afterward, having become reconciled with Antony, he formed, with him and Lepidus, the second triumvirate (see TRIUMVIRATE). This alliance resulted in a proscription, in which 300 Senators and 2,000 knights were put to death.

Rise to Power. Next year Octavianus and Antony defeated the republican army under Brutus and Cassius at Philippi, and the victors now divided the Roman world between them, Octavianus taking the West, Antony the East, and Lepidus Africa. Sextus Pompeius, who had made himself formidable at sea, was put down; and soon after, Lepidus, who had never had more than an appearance of power, was deprived of all authority and retired into private life. Antony and Octavianus now shared the Empire between them; but while the former, in the East, gave himself up to a life of luxury and alienated the Romans by his life at the court of Cleopatra, Octavianus skilfully cultivated popularity and soon declared war against the queen of Egypt. The naval victory of Actium, in which the fleet of Antony and Cleopatra was defeated, made Octavianus master of the world, 31 B. C.



AUGUSTUS
From a statue.

He returned to Rome, celebrated a splendid triumph, and caused the temple of Janus to be closed as a sign of universal peace. Gradually all the highest offices of state, civil and religious, were united in his hands, and the new title of *Augustus* was formally conferred by the senate in 27 B. C. See ANTONY; CLEOPATRA.

Achievements. Under Augustus successful wars were carried on in Africa and Asia, in Gaul and Spain, in Pannonia and in Dalmatia; but the defeat of Varus by the Germans under Arminius, with the loss of three legions, in A. D. 9, was a great blow to him. One of his great works was the adorning of Rome in such a manner that it was said, "He found it of brick, and left it of marble." The people erected altars to him as to a god, and by a decree of the senate the month Sextilis was called *Augustus*. His death, which took place at Nola, plunged the Empire into the greatest grief. Augustus was thrice married, but had no son, and was succeeded by his stepson, Tiberius. It was during the reign of Augustus that Jesus was born in Bethlehem. A. MC C.

EXTENT OF EMPIRE AT DEATH OF AUGUSTUS

1—Italy	6—Asia
2—Spain	7—Syria
3—Gaul	8—Numidia
4—Illyricum	9—Cyrenaica
5—Macedonia	10—Egypt

AUK, *awk,* a name applied to several species of diving and swimming birds found in Arctic regions and particularly common on the shores of Siberia and Alaska. They are closely related to the grebes and loons and, like them, are very clumsy on land but swim with great speed both on the surface and under the water. Auks are migratory and spend the winter on open seas, going to northern rocky coasts in the spring to breed. In colonies of tens of thousands they make their nesting places on ledges of rock, and there, with no pretense

at nest making, each female deposits one large egg. It is held in place by the webbed feet of the parent bird during the period of hatch-

THE GREAT AUK

ing. The legs of the auks are placed so far back on the body that the birds when upright appear to stand on their tails. Their wings are quite useless for flight but are extremely serviceable as fins in swimming.

The Great Auk, or **Garefowl,** which formerly inhabited northern regions and occasionally visited the British Isles, is now extinct. It was as large as a goose, and black and white in color. Eggs of this species, and some stuffed specimens of the bird, are carefully preserved in museums.

The Razor-Billed Auk is about fifteen inches in length and has a sharp and heavy bill. This species breeds in great numbers on the coast of Labrador and New Brunswick and thousands are killed every year for their breast feathers. An occasional visitor to the United States is the Little Auk, about the size of a robin and black and white in color. It is occasionally found during winter in the regions of the Great Lakes.

AULD LANG SYNE, *awld lang sine.* These Scotch words which mean *old long since,* or *the days gone by,* are the title of a very popular old song, of which the words are generally ascribed to Robert Burns. It seems most probable, however, that Burns merely rewrote a song which had been sung a century and a half before his time, adding two stanzas and giving to the whole the touch of his unique genius. The music, which seems one with the words, is an old Scottish air. Few songs are sung oftener or with greater feeling than *Auld Lang Syne.* The first stanza and the refrain follow:

Should auld acquaintance be forgot,
And never brought to min'?
Should auld acquaintance be forgot,
And days o' auld lang syne?

For auld lang syne, my dear,
For auld lang syne,
We'll tak' a cup o' kindness yet,
For auld lang syne.

AURELIAN, *aw re' li an,* Lucius Domitius (Aurelianus) (about 212-275), a Roman emperor whose firm and vigorous rule in an age of disorder and unrest gave him the title "Restorer of the Empire." Of humble birth, he rose to the highest rank in the army, and on the death of Claudius II in 270 was chosen emperor by the soldiers. He freed Italy from the barbarians, conquered the famous Zenobia, queen of Palmyra, and followed up his victories by introducing reforms and restoring order throughout the empire. He had many public works and buildings erected, and to him also is due the enlargement and restoration of the walls of Rome. Aurelian was assassinated while heading an expedition against the Persians.

AURELIUS, *aw re' li us,* Marcus (121-180), the last of the "five good emperors" of Rome, and noted also as a philosopher, was famed for his gentleness and sweetness of character. It has been said of him that he "devoted himself to the task of government with a single view to the happiness of his people." He came to the throne in the year 161, succeeding his foster-father, Antoninus Pius. Early in his reign he was forced to send an army against the Parthians, and his victorious soldiers brought home with them, in 165, a terrible Asiatic plague that swept off vast numbers of his people. In the midst of this national distress came news of the uprising of the barbarians in the regions beyond the Alps, and Aurelius, placing himself at the head of his legions, hastened to the protection of the Roman frontiers. The greater part of his life thereafter was spent in the camp or on the battlefield, in the effort to keep back the various Germanic tribes, and he died from the effects of this campaigning in the nineteenth year of his reign.

Aurelius was naturally a student and a lover of peace, and his *Meditations,* much read today, have more of the spirit of Christ's teachings than any other pagan writings. Though his reign was marred by bitter persecution

of the Christians, he permitted these because he believed the Christians menaced the prosperity of the empire. He ruled wisely and justly, and after his death the people honored him as a god.

AURIGA, *aw ry' ga,* the Waggoner or Charioteer, in astronomy the name of a constellation to the east of Perseus. The principal star is Capella, larger and brighter than the sun, but far more distant from the earth. In mythology the Charioteer is supposed to be Phaëthon, son of Apollo, who borrowed Apollo's chariot and horses and was overthrown when trying to drive them. Capella represents a goat, probably Amalthea, the goat which suckled the infant Hercules. See MYTHOLOGY, for the story of Phaëthon.

the thousands of visitors who flock to see it are enabled to do so without discomfort by means of the great mirror which has been placed beneath it. In this picture Apollo rides on the clouds in his chariot, driving his four horses with his left hand. About him cluster the hours, and above the horses flies the winged torch-bearer, Lucifer. In front, looking back at Apollo, floats the graceful Aurora, who bears in her hand flowers which she is apparently about to drop upon the sleeping world below. The coloring in this masterpiece of Guido Reni is particularly warm and pleasing.

AURORA, ILL., an industrial city, with a population, chiefly Americans, with a mixture of Hungarians and Rumanians, which increased from 29,807 in 1910 to 36,265 in 1920.

THE FAMOUS *AURORA,* BY GUIDO RENI

AURORA, *aw ro' ra,* in Greek and Roman mythology the goddess of the dawn, the radiant messenger who opened the gates of the East, that the sun god in his chariot might drive up the sky. Her rosy fingers and yellow robe represented the glowing colors which appear in the heavens before the sun rises. Aurora was a somewhat fickle goddess, and bestowed her love in turn upon Orion (which see), Tithonus and Cephalus.

The Aurora in Art. The youthful goddess of the dawn has always been a favorite in art, and various are the representations of her. Burne-Jones pictures her as a graceful, light-footed maiden, walking through quaint old-world streets which she is wakening to life by her clanging cymbals. But by all means the most famous painting of Aurora is by Guido Reni (which see). It is a ceiling painting in the Casino Rospigliosi at Rome, and

It is situated in Kane County, in the northeastern part of the state, and on the Fox River. Chicago is thirty-eight miles northeast, and many people live here whose business is in the greater city. Aurora is served by four railway lines, and electric lines connect with Chicago and adjacent towns in all directions. It is one of the greatest interurban centers in the state. The city, popularly called the *City of Lights,* was founded in 1834, was incorporated in 1840 and was named for *Aurora,* the goddess of the dawn. The area is about six square miles.

This city claims to have been the first city in the United States to light its streets by electricity, hence its popular name, above noted. The business section is near the river, and its principal buildings are the post office, built in 1892 at a cost of $117,000, and a Soldiers' Memorial Hall, erected by popular sub-

scription. There are five banks and three hospitals. The Advent College, the Jennings Seminary, three business colleges, two musical colleges, two high schools and a Carnegie Library serve the educational interests, and thirty-nine churches are distributed throughout the city. Phillips Park (twenty acres), Fox River Park (fifteen acres), Lincoln Park and McKinley Park are the recreation and beauty spots of the city, and Sylvandell, an immense dance hall, is a popular amusement resort. The extensive car shops of the Chicago, Burlington & Quincy Railroad, with 1,600 employees, are located here. Machine shops, flour and woolen mills, stove and iron works, smelting and refining works and cotton factories are among the industrial establishments. J.M.P.

AURORA, Ont., a town in York County, twenty miles north of Toronto, with which it is connected by electric lines and by the Grand Trunk and the Canadian Northern railways. It receives hydro-electric power from Niagara Falls and claims to have the cheapest power and lighting rate of any city of its size in the province. It has a number of important industrial establishments, including flour mill, tannery, planing mill and agricultural implement, furniture and boot and shoe factories. The $30,000 Dominion post office, completed in 1915, is a conspicuous building. Aurora was settled in 1857 and was incorporated as a town in 1885. Population in 1911, 1901; in 1921, 2,307. W.J.B.

AURORA BOREALIS, *aw ro' ra bo re ay' lis,* or **NORTHERN LIGHTS,** the northern Polar lights, a peculiar stream of light of great beauty, seen a short time after sunset and continuing sometimes through the night. The *Aurora Australis* is the corresponding light seen in the southern hemisphere. The path of light usually forms a fiery arch across the northern sky, with its ends on the east and west horizons and its streams of light ascending from a line of haze or cloud sometimes to a point almost directly overhead. Its rays are transient and constantly in motion, varying in color from a greenish hue or a pale yellow to a deep, blood red, and its shapes are infinite in number. The zone wherein the aurora is seen most frequently in the northern hemisphere has its center near the southern part of Hudson Bay. As one travels south of that point, the aurora is observed less frequently; near the equator it is rarely seen.

These auroras are caused by the passage of electricity through the rarified upper atmosphere, and in adjacent regions are accompanied by loud noises which resemble electrical flashes and the crackling of fire crackers. A similar effect is produced by passing electrical currents through rarified air or gases. During the appearance of an aurora the magnetic needle is subject to disturbances, showing a close connection between the aurora and magnetism. See Electricity; Magnetism.

AURORA BOREALIS
Characteristic appearance in the Polar regions, where the display is most brilliant.

AUSABLE CHASM, *aw sa' b'l kaz'm,* a picturesque gorge on the Ausable River in New York, one of the most attractive spots in the state. Hundreds of tourists visit it each year, either on foot or in the small boats which ply the river. It is about two miles long, and in some places its vertical walls are 175 feet high. On both sides steep ravines, overgrown with dusky cedars and pines, lead into it, and a walk along the edge of the precipices and over the bridges which arch these fissures well repays the visitor. Geologists also find there formations which are of interest and importance. Ausable Chasm is twelve miles from Plattsburg and one mile from Keeseville.

AUSTEN, Jane (1775-1817), an English writer who has had no superior among novelists in ability to fashion an interesting story from the everyday happenings of life in a small village. She was born in Steventon, a village of Hampshire, the daughter of a clergyman. Her mother was a niece of Theoph-

ilus Leigh, for fifty years master of Balliol College, Oxford. No startling events ever interrupted the placid current of her life, and her novels, as free from sensationalism as the author's own experiences, hold the reader's interest by reason of her clear and flowing style, delicate humor and admirable gift in story-telling. Sir Walter Scott said of her:

JANE AUSTEN

"That young lady had talent for describing the feelings and characters of ordinary life, which is to me the most wonderful I ever met with. The big Bow-Wow strain I can do myself, like any now going; but the exquisite touch, which renders ordinary, commonplace things and characters interesting from the truth of the description and the sentiment, is denied me."

Miss Austen's stories have played an important part in the development of the English novel, and her fame among English writers of fiction is secure. Her novels, numbering only six, are *Sense and Sensibility, Pride and Prejudice, Mansfield Park, Emma, Northanger Abbey* and *Persuasion.*

AUSTERLITZ, *ows' tur litz,* the name of an Austrian town which is conspicuous in history as the scene of one of the most masterly, most complete victories ever gained over superior numbers. Here in 1805 Napoleon, with 70,000 men, defeated the allied Austrian and Russian armies, with 95,000 men. The decisive victory of the French led to the Peace of Pressburg between France and Austria. Austerlitz is in Moravia, ten miles east of Brunn. In 1900 it had a population of 3,703.

AUSTIN, *aw' stin,* TEXAS, the state capital and county seat of Travis County. It is about 200 miles from the Gulf of Mexico, east of the center of the state and on the Houston & Texas Central, the Missouri, Kansas & Texas, and the International & Great Northern railroads. Fort Worth is 198 miles north and east, San Antonio eighty miles southwest, and Houston 165 miles southeast; fifty miles farther is Galveston. The population in 1910 was 29,860; in 1920 it had increased to 34,876. The area is over twelve square miles.

Austin is situated on hills rising from forty to 120 feet above the Colorado River, which runs to the south and east of the city. Two fine bridges span the river, which is navigable at this point for small craft. Austin Lake, nearly thirty miles in length, is about two miles from the city; it was created by a huge dam across the river, and supplies power for the city and affords fishing, bathing and canoeing for pleasure seekers. The old dam, which was one of the largest in the world, broke in 1900 and has since been replaced at a cost of $1,720,000. It is the river's largest dam for producing electricity.

The state capitol dominates the city from its position in Capitol Square, an elevated park of about twenty acres in the heart of the town. It is built of red Texas granite and cost $3,500,000. In 1915 it was the largest state capitol in the United States, and is said to be one of the twelve largest buildings in the world. Its floor space is almost eighteen acres in extent. It is built in the form of a Greek cross; the arm from east to west is 600 feet long, and that from north to south is 287 feet long. The dome at the intersection of these two arms rises 313 feet. The building was erected by Chicago capitalists in exchange for 3,000,000 acres of Texas public land. It contains a library and Confederate Museum, besides many executive halls.

The buildings of the University of Texas, costing about $2,500,000, the largest state university in the South, were opened in 1883. Besides these the old and new Federal buildings, costing $300,000 each, the county courthouse and the state land office are prominent structures. Austin has a number of private educational institutions, among them being Southwestern Presbyterian Theological Seminary; Saint Edward's College; Tillotson Institute (colored) and Samuel Houston College. The benevolent and charitable institutions include the Confederate Home; the Confederate Woman's Home; a state asylum for the insane; a state institution for the blind and a state institution for the deaf and dumb.

Austin's naturally very pretty parks have the great advantage of being green the year round. These include Pease Park of sixty acres, Woolridge Park, a beautiful amphitheater of three acres, and East Avenue Park of three acres, all a part of the city's park and boulevard system.

As the largest city in the central and western part of Texas, except El Paso on the extreme western boundary, Austin is the trading

and jobbing center for that great section. It has an extensive wholesale trade in harness, leather goods, groceries, dry goods and drugs. It is a market for live stock, cotton, grain, wool and hides and has large manufactories including canning plants, oil mills, planing mills, mattress factories, soap factories and many other industries.

Austin, first named Waterloo, was settled in 1838, the year of the death of Stephen Fuller Austin, the father of Texas, for whom the city was in 1839 re-named. In that year it was chosen capital of the Republic of Texas, then lately seceded from Mexico. Due to the influence of General Sam Houston, one time governor of the Texan republic, the capital was later removed to Houston. In 1845 Austin was again made the capital, and it retained that honor against three early competitors, Huntsville, Tehuacana Springs and Houston. In 1909 the city adopted the commission form of government. W.E.L.

AUSTIN, Alfred (1835-1913), an English poet who succeeded Alfred Tennyson as poet laureate in 1896. He was born near Leeds. After graduating at the University of London, he was called to the bar, in 1857, but soon gave up the law for literature. In 1870 he wrote a severe criticism of Tennyson, Browning and other poets of the time, in an essay entitled *The Poetry of the Period.* His own verse is graceful, but less imaginative than that of the poets he criticised. Among his poetical writings are *Songs of England, A Tale of True Love and Other Poems* (dedicated to Theodore Roosevelt), *The Door of Humility* and *Love Poems.* He was also the author of a drama, *Flodden Field,* which was produced in 1903 at His Majesty's Theater; and of several nature essays.

ALFRED AUSTIN
Poet laureate of England, who was succeeded by Robert Bridges.

AUSTIN, Stephen Fuller (1793-1836), the founder of Texas, and one of the two men whom the state has honored by placing their statues in the national Statuary Hall at Washington. His father, Moses Austin (1767-1821), obtained from Mexico the first grant of land for an American colony, but he died before the project could be carried out. The son, however, in 1821 established a colony of several hundred families on the Brazos River; the principal settlement was named Austin, in his honor. Austin was one of the leaders in demanding recognition for the Americans in Texas from the Mexican government, but he was at first opposed to the movement for independence. In 1835, when it became clear that no concessions would be made by Mexico, he accepted the chief command of the Texan army, but resigned after a few months. He then went to the United States, where he secured money and supplies to aid the Texans. In the next year he was an unwilling candidate for the presidency of the new Republic of Texas, but was defeated by Samuel Houston, in whose Cabinet he was Secretary of State until his unexpected death on December 2, 1836. See Texas, subhead *History.*

AUSTRALASIA, *aws tral a' she ah.* See Oceania.

AUSTRALIA, *aws tray' li a,* the smallest of the five continents, the only one entirely within the southern hemisphere, and the only one which is an island. In name as well as in location it is the southland, for the word is taken directly from the Latin and means *southern.* It is the most detached of the grand divisions, lying between the Indian and the Pacific oceans, far to the southeast of Asia, and as a result has few similarities to any of the other continents in its physical formations or its animal or plant life. Its

area of 2,948,366 square miles is about 600,000 less than that of Europe, and almost equal to that of the United States without Alaska or its island possessions. It is thus second in size only to Canada among the colonial possessions of Great Britain. For Australia, with

LOCATION MAP

Showing location of Australia with respect to the continent of Asia and the great islands to the north.

the island of Tasmania to the south, constitutes a dependency of Great Britain, and has been known since 1901 as the COMMONWEALTH OF AUSTRALIA. The article that follows treats of the continental portion of that federation, while Tasmania is considered under its own title. Each of the five states of the Commonwealth on the mainland, namely, New South Wales, Victoria, Queensland, South Australia and Western Australia, with the Northern Territory, is given separate treatment in these volumes.

The People. *The Native Races.* In a consideration of Australia the term *people* includes two classes as distinct as are the white inhabitants and the Indians of North America. For Australia also has its native races, or *aborigines,* as they are called, the word meaning literally *from the beginning.* These natives have some characteristics of the negroes, some of the Caucasian peoples, and scholars are inclined to treat them as a race distinct from all others. They are dark in color, have either wavy or straight, but never woolly, hair, thick lips and flat nose. Of medium height, they possess an inferior muscular development, nor do they seem any more highly developed mentally or morally. Indeed, by some students of racial characteristics they are placed at the very bottom of the scale of humanity. They have no fixed dwellings, living in the summer in the open air and with the coming on of winter sheltering themselves in the rudest of bark dwellings. Most of them wear no clothes, though the southernmost tribes make skin rugs for use in the winter.

As to food, they are far from particular. Any animals which they can kill—mammals, birds, lizards, snakes, grubs and even insects—are eaten, often half raw. Fire is no mystery to them, but is produced by a friction method similar to that shown in the illustration under the article FIRE. They do not cultivate the soil, domesticate animals nor make pottery, but they have fashioned for themselves a number of weapons, in the use of which they are most skilful. Among these are spears, clubs, stone hatchets and, most noted of all, the boomerang (which see). The women, obtained for the establishment of families by purchase or abduction, are looked upon as mere slaves and are frightfully mistreated. All the hard work, all the heavy carrying is done by them, the men reserving their strength for hunting and intertribal wars.

It must be understood that these primitive conditions, which prevailed everywhere at the coming of the white men, now exist only in the wild and unsettled parts of the continent. In the settled districts a few aborigines remain, for the most part on reservations, and these are sometimes employed by the settlers in light work. They are lazy by nature, however, and soon give up any continuous employment, but they possess, like the North American Indians, an almost incredible ability to follow trails through the woods and the brush, and are for this reason sometimes of use to the police. It is estimated that there were in Australia about 150,000 of these aborigines at the time the influx of white settlers began, but they have decreased rapidly, and to-day various estimates place their number at about 60,000.

White Inhabitants. These aborigines are not reckoned in with the total population of the Commonwealth, which was 5,436,794 at the last official census (1921). This includes Tasmania,

which at the same date had 213,877 inhabitants. The settlers in Australia have come largely from Great Britain, records showing that about ninety-seven per cent of the population were born either in Australia of British descent or somewhere in the United Kingdom. Among all the civilized countries of the world, none is more sparsely settled than Australia, which averages but 1.67 person to each square mile. This population is very unevenly distributed, Victoria having fifteen to the square mile and the Northern Territory but one person to each 175 square miles of area. Strangely enough, in an agricultural country, the tendency is strong for the people to congregate in the big cities. Thus it is estimated that 38.05 per cent of the inhabitants are distributed among the six capital cities and their suburbs. These capitals are Melbourne, Victoria; Sydney, New South Wales; Brisbane, Queensland; Adelaide, South Australia; Perth, West Australia; Hobart, Tasmania. Northern Territory is still so new that its capital, Darwin, has not grown beyond the size of a village.

The Australian states have always done much to encourage immigration, not only by making the acquisition of land easy, but even by paying a part or all of the expenses of desirable settlers. The heaviest immigration for any decade occurred between 1881 and 1890, when there were 244,284 more arrivals than departures. Later, when the charm of newness died

COMPARATIVE AREA
Australia and the United States

out, immigration decreased, and between 1896 and 1905 there were more emigrants than immigrants; but the tide again turned and in recent years the number of arrivals has been very large.

Coast Line and Islands. Like the great continent of Africa to the west, Australia has a comparatively regular coast line. On the south the shore curves gently inward, forming the Great Australian Bight; on the north a sharper incurving makes the Gulf of Carpentaria, inclosed within the peninsulas of York and Arnhem Land; and there are a few lesser indentations. But nowhere is there such a condition of fiords and outstanding capes as prevail in certain parts of North America, Europe and South America. Its coast line of 11,310 miles is little more than two-thirds that of Norway, if all the indentations of the latter are taken into account.

Of the islands close to the Australian coast only two, Tasmania and New Guinea, are of considerable importance. Some of the others are but jutting rocks or coral reefs, and many of them are uninhabited. To the north and east lies the great group of the East Indies, containing the largest islands in the world, and scientists have found what they regard as convincing evidence that in ages past these islands joined Australia with Asia, which at its nearest point is now 1,800 miles away. The transition nature of the plant and animal life in the East Indies would not alone suffice as evidence, but the shallowness of most of the intervening waters seems to indicate that the islands are merely the highest points of a long-submerged continental land mass. Perhaps even New Zealand, to the southeast, was once connected with Australia geographically.

A most interesting feature of the coast of Australia is the Great Barrier Reef, a coral formation which extends for almost 1,000 miles along the northeast coast, at places as close as ten miles to the shore, elsewhere as much as 100 miles away. When storms are raging this great reef may be very dangerous, and many ships have been wrecked upon it, but for the most part it is helpful rather than harmful, as it constitutes a natural breakwater shielding ships inside it from the storms of the open ocean.

Surface Features. This smallest of the continents or largest of the islands, as it is sometimes called, is much simpler in its relief forms than any of the other great land masses. A glance at the accompanying colored map of Australia will help to fix in the mind the continent's physical features. The chief mountain system, which does not approach in height those of the other continents, is known as a whole as the Eastern Mountains, though it is given various local names in different sections of the country, as the Australian Alps, in Vic-

toria, the New England Range and the Liverpool Range. Beginning near the western boundary of Victoria, this chain of highlands extends nearly parallel with the coast as far as Cape York. On the average it is about 150 miles in width, and is distant from the coast from fifty to 300 miles. It performs the regular "great divide" function, separating the rivers flowing into the Pacific from those flowing into the interior or into the Indian Ocean. On the whole this mountain system is little higher than the White Mountains, though its loftiest peak, Mount Kosciusko, in Victoria, is 7,350 feet in height. These are not steep, craggy mountains like the great divides of the other continents, but for the most part rounded summits. Some of them, however, are lofty enough to be snow-clad for a large part of the year, and certain sheltered ravines can boast eternal snow.

To the west of this mountain country is the great Australian lowland, lowest in the southeast, and rising gradually to the north and west. The eastern part of this lowland region is the basin of the Murray River system; the western, the region of interior drainage, an arid stretch which has no outlet for its rivers. For a length of 1,000 miles along the southern coast not even a little stream empties into the sea, and the most of the river beds are dried and cracked mud. This lowland region, though called the Great Australian Plain, is not a level expanse like the North American prairies, but is broken by low ranges of hills.

The westernmost section is a great plateau, which constitutes over half of the continent and has an average elevation of about 1,000 feet. Along its seaward edge runs a ridge of high land parallel with the coast. The highest peak in this western plateau region is 5,200 feet in height.

Rivers and Lakes. The river system of Australia is not large, and rivers of any importance are very few. The Murray, with its tributaries, the Darling, the Lachlan and the Murrumbidgee, constitutes by far the largest system, and drains about one-seventh of the continent. Its source streams rise on the western slopes of the Eastern Mountains, and even in the dry seasons are fed by the snows of the mountain tops. East of the great divide there are a number of short rivers which, considering their length, carry down to the sea a surprisingly large volume of water. In the season of melting snows sudden overflows are very common. Flowing into the Gulf of Carpentaria and draining the tropical lowland of the north are the Leichhardt, Flinders, Gilbert and Mitchell rivers, while on the west the Murchison, Gascoyne, Ashburton and Fortescue empty into the Indian Ocean.

Most interesting, though not most important, are the streams of the interior drainage region, of which Cooper Creek is the largest. These can scarcely be said to "empty" into anything, for they seldom carry water, but at such times as streams do flow over their dry courses they discharge into Lake Eyre, the largest lake in Australia. The water of this lake, which has no outlet and lies below sea level, is salty. Eighty miles long and forty miles wide during the rainy season, Lake Eyre undergoes a considerable shrinkage during the dry months when the region all about it becomes practically a desert. Other lakes without outlet in this same section are Torrens, Gairdner, Blanche and Frome, named for early explorers.

Climatic Conditions. A large, compact land mass tends always to a more extreme climate than one which is in all parts not far from the tempering influence of the sea, and Australia typifies this condition. The northern section of the country is tropical, the central part semi-tropical and the south temperate, but latitude is not as great a factor in controlling temperature as are altitude and distance from the sea. In summer, which corresponds to the winter of the northern hemisphere, the heat is very great throughout much of the continent, for the sun is at that time not only most nearly vertical above it, but is also at its closest approach to the earth. The interior section thus has an average summer temperature of about 95°. This portion cools down rapidly with the approach of winter, and violent cold winds, commonly known as "southerly busters," blow from it to the more temperate eastern coast section. The coast regions, indeed, whether eastern or western, have a climate which is in the main delightful and most healthful, for even during the hot season the air is invigorating.

Rainfall is very unevenly distributed. On one side of the Great Divide every growing plant may be parched and dying, while on the other side torrents may be falling and crops suffering from the overflow of rivers. The tropical region to the north is very well watered, the east has sufficient and sometimes more than sufficient rainfall, and the west coast in places is not arid, but the vast interior regions, stretching south to the Great Aus-

tralian Bight, has an average of not more than five inches of rainfall in the year.

Plant Life. The isolated position of Australia has resulted in very decided peculiarities in its plant life. Some forms of East Indian vegetation have taken root there, but the most characteristic plants are unlike those of the other continents and come somewhat lower in the scale of development. In past geologic ages such plant forms as now exist in Australia covered the earth, but to-day they have practically disappeared elsewhere. Fully 7,000 out of the 12,000 species of plants found in the continent are not to be found in any other. The sharp difference in climate and in conditions of moisture, too, have had their influence, and the vegetation shows well-marked zones. Many of the peculiar species show an unmistakable relation to the general dryness, having either scanty foliage, narrow leaves that present little surface for evaporation or thick, leathery leaves well fitted to retain moisture.

Since not all Australia is arid, however, not all of its plants are of this semi-desert type. In the north and east a luxuriant tropical vegetation prevails, and it is here, where Australia approaches most closely the East Indies, that certain forms common in the Malay Archipelago appear. Ferns, palms, bamboos, the extraordinary bottle tree, acacias and the eucalyptus flourish, the latter attaining its greatest height on the plains of Victoria. This huge tree, which rivals the "big trees" of California in size, is one of the most characteristic Australian types. Of its 150 species, all but three or four are native to this smallest of the continents. Other gum trees also abound, and the acacia, or wattle, is one of the most valuable plants economically, as it yields an excellent bark for tanning. Throughout the forests gorgeous orchids, brilliantly flowered mistletoes and other parasitic plants combine with the crimson or golden flowers of certain species of the acacias to present a most striking appearance.

In the interior section and along the southern and parts of the western coast, however, vegetation is not so luxuriant. Large stretches in the arid region are covered with the characteristic spinifex, or porcupine grass, a hard, coarse and exceedingly spiny plant, which renders traveling difficult, wounds the feet of horses and cannot be eaten by any animal. The scrub, or "bush," as it is more commonly called, is made up of various stunted growths of the eucalyptus and myrtle families, crowded so thickly in certain localities as to be actually impenetrable. The gums and volatile oils which these trees contain give to the bush a fragrance as delightful as that of a North American forest where balsam firs abound. It is the bush for which Australia stands in the minds of many people, for almost every man brings from his boyhood memories of *The Bushrangers,* a fascinating story which made that part of the continent very real to him.

Of native fruit trees Australia has practically none, nor are its food-yielding plants of other kinds much more important. Many European plants have been introduced, however, and the vine, the olive, the mulberry and the various cereals thrive well, while large tracts, especially in Queensland, are devoted to sugar cane and pineapples.

Animal Life. As peculiar as the plant life, and even more interesting, are the animals of Australia. Geologists hold that this continent is one of the very oldest parts of the world, and the animal life bears them out in their theory that it must have been separated from the other lands of the eastern hemisphere untold ages ago. Of the many mammals which all the other continents possess—the cats, horses, cattle, lions, bears, elephants—Australia has none. A wild dog known as the *dingo,* several kinds of bats and a few rodents are the only representatives of the higher animals, all the other mammals belonging to a more primitive class known as *marsupials.* These animals are distinguished by the fact that the young are very immature when born, and are carried by the mother in a pouch until they are able to shift for themselves. Outside Australia, such pouch animals are found nowhere else except in the opossums of North America. The kangaroo, the larger forms of which comprise the biggest animals of Australia, is the best known of these marsupials, but the wombats, the opossums and the bandicoots are equally interesting and curious. Like the mammals of the other continents, some of these pouch animals are flesh-eaters, some root-eaters, some fruit-eaters, and many of them resemble more or less closely the common animals of other parts of the world.

The marsupials, however, are not the lowest order of mammals that Australia possesses, the echidna and the duck-billed platypus ranking farther down in the scale of life. These are, so far as is known, the only mammals in the world that lay eggs.

SOME AUSTRALIAN ANIMALS

Duck-billed platypus

Black swan and her young

Rabbits became a plague throughout Australia

The awkward but powerful kangaroo

The beautiful parakeet

The bat
He is out all night

The dreaded and deadly python

The splendid lyre bird

Emu, the "Australian Ostrich"

Of birds Australia has a large variety, no fewer than 800 distinct species; but these are not so peculiar to the continent as are the mammals. The emu, or Australian ostrich, and the cassowary are the largest of the bird tribe, as the parrots are the most numerous. These latter, with their brilliant green, yellow and scarlet plumage, everywhere add to the color of the landscape. Song birds vie with those of North America in the sweetness of their notes, and eagles and hawks prey upon smaller and weaker forms of life. Peculiar to Australia are the black swan, the honey-sucker, the lyre bird with its curious plumage, and the bower bird, distinct from all other birds by reason of the fantastic structures which it rears for its own delight.

Reptiles and fish are also numerous and varied, and while some of these are most characteristic, the greater number of them bear resemblances to those of other countries. Each animal named here is described and illustrated in its place in these volumes.

Mineral Resources. Interesting as are its life forms, fertile as are some of its plains, these advantages alone would never have drawn to this isolated island-continent, with its waste of waters on three sides, the hundreds of thousands of colonists who have made it the progressive section of the world that it is to-day. It is gold that has made Australia important commercially; gold that drew, after its discovery in 1851, streams of adventurers half across the world. And from that date to this, gold-mining has been one of the chief industries. Scores of thousands are employed in it, and the yearly output of the precious metal averages over $50,000,000. Victoria has produced the largest total amount, but of recent years the mines of Western Australia have far surpassed those of any other state. Altogether, the continent has produced since 1852 over $3,000,000,000 worth of gold.

But gold is not the only important mineral. Silver, which was first mined in 1841, is produced by all the states, New South Wales having by far the largest output. In all, the silver yield, including the value of the lead found with it, is $20,000,000 a year, while copper falls but $5,000,000 short of that amount and coal production has steadily increased to over $22,000,000. Queensland ranks first among copper-producing states, and New South Wales is by far the largest producer of coal, its yield being more than ten times that of any other state. Zinc, iron, lead and various precious stones in small quantities are also found, and it may thus be seen that Australia is one of the world's richest mining regions.

Agriculture. Not all the people of Australia are miners or seekers after gold, for agriculture in its various forms has attained great importance. In the vast interior arid region and along much of the western coast little can be grown, for while the soil and climate are excellently adapted to any of the warm-temperate or semi-tropical crops, the moisture is too scanty for production. No great rivers suggest the possibility of extensive irrigation schemes, but, as in certain of the desert regions of the Western United States, there frequently exists below the surface a considerable supply of water which is made available by means of artesian wells. Hundreds of these dot the country and are helping to increase the proportion of cultivated land. Even so, however, the area devoted to crops is comparatively small—only about 15,000,000 acres in the whole Commonwealth. Practically all of this is in the well-watered eastern section, on both sides of the Great Divide. Wheat is by all means the most important crop, but corn, oats, barley, potatoes, sugar cane and hay are produced in sufficient quantities to supply home demand.

Irrigation development was started in the state of Victoria under the supervision of Americans, and having proven successful was extended. In New South Wales there is now under construction the Burrinjuck dam, on the Murrumbidgee River, which when completed will impound 33,381 million cubic feet of water, enough to irrigate over 250,000 acres of land.

To the present time Australia has been preeminently a stock-raising country, but it is predicted that the transformation of Australia from a grazing to an agricultural country will parallel that of the Western United States. Wherever there is sufficient moisture for grass —and grass will grow where no crops can be produced—the conditions have been found excellent for sheep, and everywhere there have been great flocks. More valuable even than gold have been these sheep, of which Australia has greater numbers than any other country in the world. Naturally, then, it is the chief of all wool-producing countries, the yield in some years exceeding 700,000,000 pounds, often being twice that of Argentina or the United States. Of recent years, too, mutton has been exported, though formerly all the sheep were grown for their wool.

Cattle also thrive on the excellent Australian

AUSTRALIA

AREA AND POPULATION‡

Political Divisions — States	Dimensions N. to S. Miles	Dimensions E. to W. Miles	Area Sq. Miles	Coast Line Miles	Population * Males	Females	Total	Seat of Government	Population† Est.
New South Wales	500	600	309,460	700	962,053	869,663	1,831,716	Sydney	725,400
Queensland	1,250	950	670,500	3,000	356,613	303,545	660,158	Brisbane	151,300
South Australia	880	754	380,070	1,540	221,605	218,442	440,047	Adelaide	196,500
Tasmania	200	245	26,215	900	104,476	97,199	201,675	Hobart	40,000
Victoria	480	250	87,884	680	706,948	705,171	1,412,119	Melbourne§	651,000
West Australia	1,400	800	975,920	4,350	180,747	139,937	320,684	Perth	121,700
Territories									
Federal Territory	...	...	912	.....	1,093	895	1,988	Canberra	.....
Northern Territory	1,091	600	523,620	1,040	2,995	677	3,672	Darwin	2,000
Commonwealth‡	1,971	2,400	2,974,581	11,310	2,536,530	2,335,529	4,872,059	Melbourne	651,000

* Official estimate, exclusive of aborigines.
† Metropolitan District.
‡ The Australian Dependency of Papua or New Guinea has an area of 90,540 sq. miles and a native population of 250,393: White population (1911), 1,186. § Present capital of Commonwealth.

FOREST RESERVES AND FOREST AREAS, 1913

Division	Reserved for Timber Acres	Total Forest Area Acres
New South Wales	6,853,828	15,000,000
Queensland	4,108,470	40,000,000
South Australia	154,232	3,800,000
Tasmania	1,017,949	11,000,000
Victoria	4,160,342	11,800,000
West Australia	12,371,152	20,400,000
Commonwealth	28,665,973	102,000,000

LEADING INDUSTRIES

Industry	Value of Products 1912	1913
Agriculture	$ 222,364,440	$ 224,823,600
Dairying, etc	98,560,800	98,857,260
Forests and Fisheries	31,259,520	30,802,680
Manufactures	277,126,920	299,307,960
Mining	124,556,940	125,126,880
Pastoral	250,848,900	281,228,760
Total	1,004,717,520	1,060,147,140

GOVERNMENT AND PRIVATE RAILWAYS. MILEAGE OPEN

Year	N. S. Wales	Queensland	S. Australia	Tasmania	Victoria	W. Australia	N. Territory	Fed. Territory	Commonwealth
1855	14		6¾		2½				23¼
1861	73		56		114				243
1871	358	218	133	45	276	12			1,042
1881	1,040	800	845	168	1,247	92			4,192
1890–1	2,263	2,205	1,666	425	2,763	656	145		10,123
1900–1	2,926	2,904	1,736	618	3,238	1,984	145		13,551
1910–11	4,027	4,390	1,993	675	3,574	3,208	145		18,012
1912–13	4,197	4,936	2,202	729	3,698	3,827½	145		19,734½
1914–15	4,246	5,213	2,357	766½	3,886	3,910	146	5	20,529½

PRINCIPAL RIVERS

River	Length Miles	Outlet
Ashburton	220	Indian Ocean
Barcoo	310	Coopers Creek
Bogan	370	Darling River
Brisbane	200	Moreton Bay
Burdekin	440	Upstart Bay
Castlereagh	340	Macquarie River
Clarence	190	Shoal Bay
Cloncurry	280	Flinders River
Condamine	320	Balonne River
Cooper	300	Lake Eyre
Culgoa	200	Darling River
Daly	225	Anson Bay
Darling	2,310	Murray River
Dawson	312	Fitzroy River(Q'l'd)
De Gray	427	Indian Ocean
Diamantina	468	Lake Eyre
Fitzroy (W. A.)	325	King Sound
Flinders	520	Gulf of Carpentaria
Fortescue	340	Indian Ocean
Gascoyne	475	Shark Bay
Gilbert	312	Gulf of Carpentaria
Glenelg	280	Discovery Bay
Hawkesbury	335	Broken Bay
Hunter	340	Pacific Ocean
Lachlan	850	Murrumbidgee R
Leichardt	300	Gulf of Carpentaria
Macquarie	590	Macquarie Marsh
Mitchell (Q'l'd)	350	Gulf of Carpentaria
Murchison	440	Indian Ocean
Murray	1,520	Lake Alexandrina
Murrumbidgee	1,050	Murray R.
Namoi	430	Darling R.
Norman	260	Gulf of Carpentaria
Ord	300	Timor Sea
Roper	260	Gulf of Carpentaria
Shoalhaven	260	Pacific Ocean
Snowy	270	Pacific Ocean
Swan	240	Indian Ocean
Victoria	350	Queen's Channel

PRINCIPAL MOUNTAINS

Name	Location	Altitude
Bogong	Victoria	6,509
Buffalo (the Horn)	Victoria	5,645
Buller	Victoria	5,935
Cobberas	Victoria	6,030
Cope	Victoria	6,027
Fainter	Victoria	6,160
Feathertop	Victoria	6,306
HigginbothamHeights	Victoria	5,800
Hotham	Victoria	6,100
Kosciusko *	N. S. Wales	7,328
Loch	Victoria	5,900
McKay	Victoria	6,030
Marm's Point	Victoria	5,860
Nelson	Victoria	6,170
Pilot	N. S. Wales	6,020
Ram's Head	N. S. Wales	6,600
Reynard	Victoria	5,700
Spion Kop	Victoria	5,950
The Peaks	Victoria	5,300
The Twins	Victoria	5,502
Townsend *	N. S. Wales	7,238
Twynan	N. S. Wales	7,200
Wellington Trig	Victoria	5,355
Wills	Victoria	5,758

* Close to Victoria boundary.

AUSTRALIA

ENGLISH STATUTE MILES
0 50 100 200 300 400 500

KILOMETERS
0 100 200 300 400 500 600 700 800

Railroads ——— Principal water routes. ———

TASMANIA
Same scale as Australia

NEW ZEALAND
Same scale as Australia

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NEW ZEALAND

AREA AND POPULATION

Units of the Dominion Main Islands	Coast Line Miles	Area Sq. Miles	Population Census, ‡ 1911	Provincial Districts	Area Sq. Miles	Population § Totals, 1913	Males, 1914	Females, 1914	Totals, 1914
North	2,200	44,130	563,729	Auckland	26,746	287,789	152,346	138,077	290,423
South	2,000	58,120	444,152	Canterbury	14,040	184,472	94,896	93,009	187,905
Stewart	130	662	325	Chatham Islands	375	267	171	96	267
Lesser Islands				Hawke's Bay	4,410	52,756	27,584	25,408	52,992
Antipodes				Kermadec Islands	15	4	2	2	4
Auckland (Group)				Marlborough	4,753	17,235	9,405	8,115	17,520
Bounty (Group)				Nelson	10,269	51,229	28,678	23,690	52,368
Campbell				Otago					
Chatham (Group)		375	453	Otago portion	25,487	139,887	71,060	70,942	142,002
Cook (Group) *		150	6,935	Southland portion		63,276	34,365	30,261	64,626
Kermadec		15		Taranaki	3,398	56,500	29,970	26,877	56,847
Snares				Wellington	11,003	214,193	110,638	103,641	214,282
Other islands *		130	5,663	Westland	4,641	16,754	9,219	7,810	17,029
The Dominion	4,330	†103,581	‡1,058,312	The Dominion ‡		1,084,662	568,161	527,833	1,095,994

* Annexed in 1901. † Exclusive of Islands annexed in 1901. ‡ Including 49,044 Maoris, 2,630 Chinese and 2,879 half-castes, members of Maori tribes. § Estimates.

POPULATION OF CITIES

Cities	1911	1915
Auckland	40,536	65,005
With suburbs	102,676	117,793
Christchurch	53,116	58,169
With suburbs	80,193	87,756
Dunedin	41,529	49,446
With suburbs	64,237	69,158
Wellington *	64,372	67,446
With suburbs	70,729	74,811

* Seat of Dominion Government.

POPULATION OF TOWNS

Towns	1911	1915
Gisborne		9,859
With suburbs		11,802
Invercargill	12,782	14,592
With suburbs	15,858	18,067
Napier	10,537	11,125
With suburbs	11,736	12,701
Palmerston North	10,991	12,206
Timaru	11,280	13,123
Wanganui	10,929	13,955
With suburbs	14,702	16,235

LEADING INDUSTRIES

Industry	1907–8	1910–11
Agriculture	$ 20,102,245	$ 20,753,945
Pastoral	98,938,550	127,084,150
Mining	18,879,175	18,874,490
Manufactures	36,204,565	38,204,565
Miscellaneous *	8,833,610	10,399,330
Totals	182,959,145	215,316,480

* Including fisheries and forestry.

COMMERCE

Year	Total Imports	Exports of Domestic Produce	Total Exports
1911	$ 97,729,395	$ 93,909,490	$ 95,142,450
1912	104,882,870	106,362,025	108,852,905
1913	111,441,510	112,889,450	114,933,610
1914	109,280,480	129,923,585	131,307,235
1915	108,644,170	155,190,660	158,744,560

STATE RAILWAYS*

Year	Length Miles	Passengers Number Carried	Freight Tons	Train Mileage	Sections	Length Miles	Sections	Length Miles
1896	2,014	4,162,426	2,175,943	3,307,226	N. Island, main line	1,101	Westland	157
1901	2,212	6,243,593	3,461,331	4,620,971	Whangarei	74	Westport	36
1906	2,407	8,826,382	4,415,166	6,413,573	Kaihu	20	Nelson	61
1911	2,753	11,200,613	5,863,674	8,141,075	Gisborne	44	Picton	48
1915	2,945	13,565,772	6,453,472	9,383,420	S. Island, main line	1,404	Total	2,945

* There are, in addition to the State Railways, only 29 miles of private railway.

PRINCIPAL RIVERS

Name	Length Miles	Outlet	Name	Length Miles	Outlet	Name	Length Miles	Outlet
Awatere, S. I.	70	Cook Strait	Motueka, S. I.	75	Cook Strait	Waiau, S. I.	110	Pacific Ocean
Buller, S. I.	105	Tasman Sea	Ngaururoro, N. I.	85	Pacific Ocean	Waiau, S. I.	115	Foveaux Str.
Clarence, S. I.	125	Pacific Ocean	Oreti, S. I.	105	Foveaux Str.	Waikato, N. I.	220	Tasman Sea
Clutha, S. I.	210	Pacific Ocean	Rakaia, S. I.	95	Pacific Ocean	Waimakariri, S. I.	93	Pacific Ocean
Grey, S. I.	75	Tasman Sea	Rangitaiki, N. I.	95	Pacific Ocean	Wairau, S. I.	105	Cook Strait
Hurunui, S. I.	90	Pacific Ocean	Rangitata, S. I.	75	Pacific Ocean	Wairoa, N. I.	95	Tasman Sea
Manawatu, N. I.	100	Cook Strait	Rangitikei, N. I.	115	Cook Strait	Waitaki, S. I.	135	Pacific Ocean
Mataura, S. I.	120	Foveaux Str.	Taieri, S. I.	125	Pacific Ocean	Wangaehu, N. I.	85	Cook Strait
Mohaka, N. I.	80	Pacific Ocean	Thames, N. I.	90	Pacific Ocean	Wanganui, N. I.	140	Cook Strait

PRINCIPAL MOUNTAINS

Name	Altitude Feet	Name	Altitude Feet	Name	Altitude Feet	Name	Altitude Feet
Aspiring, S. I.	9,949	Egmont, N. I.	8,260	Peterman, S. I.		Southern Alps, S. I.	*10,000
Cook, S. I.	12,349	Hector, S. I.		Ruapehu, N. I.	9,175	Tongariro, N. I.	6,140
Earnshaw, S. I.	9,165	Ngauruhoe, N. I.	7,515	Sefton, S. I.		Tyndall, S. I.	

* 10,000 to 12,000.

grazing lands, the number in the Commonwealth averaging about 10,000,000, about as many as in Texas and Iowa together. Since the discovery of successful cold-storage methods much beef has been exported, and butter is also sent to Asia and to Europe. (More detailed information as to agricultural products as well as commerce may be gained from the articles on the separate states.)

Manufactures. Until the establishment of the Commonwealth in 1901 the manufacturing industries had been but slightly developed, but since that date they have grown steadily. Manufacturing, however, is still far from ranking as one of the chief industries, for mining and the raising of live stock have been so profitable that it has seemed unwise to devote large capital and energy to the making of articles which could be obtained cheaper from other countries. The majority of the factories established deal with raw materials which cannot be shipped safely or with profit, so industries connected with food and drink rank high in the scale. Others of chief importance are the clothing and textile industries, metal working and the manufacture of machinery.

Transportation and Communication. Since the rivers of Australia are few, railways must run everywhere if there is to be intercommunication and development, but much of the country beyond the coast regions is so sparsely

AUSTRALIAN RAILROADS

settled that it can afford no proper return on capital invested in railroads. Government construction has thus been made necessary, and to-day private companies own fewer than 2,000 miles out of a total mileage of 23,300. It is the states and not the Commonwealth which have built these lines, but the Federal government was engaged during 1916 on a transcontinental line joining the railways of South Australia with those of Western Australia, and there will probably be begun in the near future a line from the northern limit of South Australia to Pine Creek in the Northern Territory, the terminus of the road from Darwin. The accompanying map shows actual lines in existence in 1916, those under construction and those merely proposed. Government investments in railroads have been more profitable than it was believed they could be, yielding a net return annually of four and a half per cent on the cost of construction and equipment.

The Commonwealth government owns and operates the telegraph and telephone systems, which furnish excellent service. Telegraph lines extend across the continent from north to south and from east to west, and connect all the important towns. In all, there are about 50,000 miles of line. A continent so entirely cut off from the rest of the world has great need of cable communication, and two main lines connect it with all the countries of the world. There are also cable connections with Tasmania and New Zealand.

As the world's greatest producer of raw material in proportion to population, Australia has established a very large foreign commerce, the per capita value of its trade each year being over $150. Millions of tons of merchandise enter and leave its ports each year, by far the larger proportion coming from or going to British possessions. The chief exports are wool, hides, wheat, butter, meat and gold, while the imports, sometimes exceeding them in value, include manufactured goods of all kinds.

Education. As in the United States, there is no national system of education, but each state has its own carefully worked-out system. Attendance is free and compulsory for children between the ages of six and fourteen, and of recent years the compulsory law has been very strictly enforced. Even in the rural districts where but a few children can be brought together schools are provided. High schools, colleges and universities complete the scheme, the states differing little save in the working out of details. At each state capital a university is located, the one at Perth having been opened in 1913.

A distinctive feature of the Australian schools is the religious instruction that is provided by them. It is given outside of school hours, however, and by ministers instead of the regular teachers.

Government. The Commonwealth of Australia is a federation of states which was formed in January, 1901. Nominally it is a dependency of Great Britain, but actually it is independent in all questions which concern the federated states. Its constitution resembles closely that of the United States in that it expressly declares that all powers not specifically allowed to the central government belong to the states. In many ways, however, it differs from any constitution previously prepared, and some students of politics regard it as a step in advance of any other. Thus the Federal government takes charge of banking and insurance, marriage, divorce, parental rights and guardianship, immigration and emigration, telegraphs, telephones, and in times of danger, of the railways. All these functions are in addition to those commonly delegated to a national government. Women have full suffrage on equal terms with men.

Some of the other important governmental policies of Australia have been expressed in laws providing for old age and invalid pensions; a maternity bonus whereby a mother can receive a sum equal to $24 on the birth of each child; eight-hour work day; governmental loans to farmers for improving land; the building of working men's cottages, which are then rented or sold on very easy terms; and governmental ownership or control of all public utilities.

Executive Department. The head of this department is a Governor-General, appointed by the Crown. He is commander-in-chief of the army and navy, and has power to appoint judges and members of his executive council. These ministers, including a Prime Minister and the heads, respectively, of departments of External Affairs, Home Affairs, Finance, Trade and Customs, Defense, besides an Attorney-General and a Postmaster-General, are members of the Parliament, or must secure election to it within three months after their appointment.

Legislative Department. This consists of two houses, a Senate and a House of Representatives, but the British sovereign is also a nominal member. Senators are elected for six years and Representatives for three, each state having six Senators and a number of Representatives proportionate to its population. The number of Representatives is as nearly as possible twice the number of the Senators. All revenue bills must originate in the lower house, and the course of procedure is similar to that in the Congress of the United States. The Senate may reject an appropriation bill, but may not amend it.

Judiciary. At the head of this department is the High Court of Australia, which has original jurisdiction in cases involving relations with other nations and in cases in which the Commonwealth or any state is a party. Its appellate jurisdiction gives to it the power to hear appeals from lesser Federal courts and from the supreme courts of the states. If the High Court declares its opinion that a question involving the limits of the constitutional powers of the Commonwealth or of the separate states should be passed upon by the British Privy Council, an appeal to that body may be made, but not otherwise. See PRIVY COUNCIL.

On January 1, 1911, the national government took over from New South Wales a stretch of land 900 square miles in extent as a Federal Territory, under the name of the Yass-Canberra District; and two years later work upon a new Federal capital was begun. An architect from the United States, winning in a world-wide competition, was engaged to lay out the city, which in time will probably rank with the world's finest capitals. Meanwhile, until the new city of Canberra is ready, Melbourne is the seat of the Federal government.

Defense. It has never been the policy of the Australian federation to maintain a large standing army, but since 1910 all male citizens between the ages of twelve and twenty-six have been compelled by law to undergo military training, either in a cadet corps or as regular citizen soldiers. Thus while the regular army on a peace footing numbers less than 3,000, a force of about 170,000 is available when needed. The Australian troops are well drilled, and particularly effective in their mounted infantry service.

In 1903 it was decided that Australia was to have no ships of its own, but was to be defended by a small squadron from the British navy. Six years later, however, this plan was changed, and arrangements were made for the construction of Australian dreadnaught cruisers and submarines. At the close of 1913 there were in the Australian navy ten war vessels of all sorts, with a fighting force of nearly 8,000 men.

In time of peace the Commonwealth has full control of the navy, but when the British Empire is on a war footing the latter assumes full control. When the War of the Nations began in 1914 Australia showed the most active and enthusiastic patriotism. Even before the

declaration of war by Great Britain the Commonwealth newspapers declared that the navy was at the instant service of the mother country, and immediately after the declaration Australian volunteers were numerous. After a brief period of training, 20,000 of them were sent out, and these were followed shortly by 10,000 more. A landing force from an Australian warship took possession of the German island of New Guinea, and another war vessel of the Commonwealth sank the commerce-destroying German cruiser *Emden.* Both of these events occurred during the first six months of the war.

History. The history of Australia divides itself into two distinct periods—the colonial period and the period of federation; and though the latter is far shorter, it has been of greater moment to the country.

Exploration and Colonization. Vague hints of a land mass in the far-off southeastern seas were common before any definite knowledge was possessed, and it is not known just when the continent was discovered. At some time previous to 1542 the Portuguese published an account of the existence of a land beyond the East Indies, and it is probable that mariners of that nation were really the first to see the continent. But the first certain knowledge of it was obtained from a Dutch navigator who sailed from Java in 1606 and explored a portion of the eastern shore of the Gulf of Carpentaria. Other Dutch navigators during the next quarter-century pursued the advantage thus gained, and in 1642 Abel Jansen Tasman discovered the large island which now bears his name, but which he called Van Diemen's Land. A few years later the island-continent was given the name *New Holland,* and this it bore until about the middle of the nineteenth century.

The Dutch made no attempt to establish settlements in the new-found land, nor for a long period was any attention paid to it by navigators of other nations, except for a few casual visits. In 1770, however, Captain James Cook, returning from New Zealand, coasted north along the eastern shore and took possession in the name of England of a great tract which he called New South Wales. To one little indentation where he went ashore he gave the name of Botany Bay, because of the innumerable strange plant forms which were then found. Some years later, in 1788, the British sent out to this spot a company of convicts, and a penal settlement was established where Sydney now stands (see BOTANY BAY). Other convicts were later transported, and as their terms expired they acquired land, began to till the soil, and built up a real colony. Adventuring men from England and many serious-minded people from other quarters in search of new opportunities also came, and gradually the new community became more law-abiding and more attractive to the better class of settlers.

Exploration continued, but not until 1813 did anyone succeed in crossing the mountains and making his way into the interior. The circumnavigation of the island-continent was completed in 1822, and the few rivers were explored practically to their sources. Tales of daring but slightly less thrilling than those told of the great African explorers of the nineteenth century are related of those who at intervals tried to make their way across the continent from north to south or from east to west; more than one determined explorer disappeared into the great interior desert region and was never heard of again. As late as 1896 the journey by direct route from north to south was looked upon as a feat of great hardihood.

Discovery of Gold. Meanwhile other settlements had grown up along the eastern and southern coasts, and the grassy plains to the west of the mountains had been appropriated by the sheep-raisers. And then, in 1851 came the news that gold had been found at Summerhill Creek, in New South Wales. Later it was found in Victoria, and the great Ballarat gold field was opened up. Excitement was intense. Settlers who had been making excellent profits from their stock-raising; adventurers who longed for easy wealth; speculators from lands beyond the sea, rushed by thousands to the points where gold had been found. Ordinary pursuits were entirely neglected, the little cities were almost overwhelmed by the crowds that poured into them—2,000 people came to Melbourne each week during 1852—and law and order were practically overthrown. Within a decade the excitement wore off, however, while the states profited by the increase in population and in trade which had come to them.

Efforts Toward Federation. The present political divisions were in these early years all distinct colonies, and commerce among them did not thrive, since some had adopted free trade and others protective tariff principles. It soon became apparent that a union of some kind would be beneficial to all, and as early

OUTLINE AND QUESTIONS ON AUSTRALIA

Outline

I. Position

(1) Latitude, 10° 50′ to 39° 10′ south
(2) Longitude, 112° 52′ to 153° 34′ east
(3) Surrounding seas

II. Size

(1) Length, 2,400 miles
(2) Breadth, 1,900 miles
(3) Area, 2,946,700 square miles
(4) Rank, the smallest of the continents
(5) Comparative size

III. Shape and Coast Line

(1) Oblong, compact mass
(2) Regular coast line; length, 8,800 miles
(3) Few indentations
  (a) Great Australian Bight on the south
  (b) Gulf of Carpentaria on the north
(4) Islands
  (a) Tasmania
  (b) East Indies
(5) The Great Barrier Reef

IV. Surface Features

(1) Lacks variety
(2) Low, rounded mountains
(3) Arid lowlands
(4) The Great Plateau

V. Drainage

(1) Small river systems
(2) Most important rivers
  (a) Rivers of the north
  (b) Rivers of the west
  (c) Interior rivers
(3) Lakes

VI. Climate

(1) Extremes of temperature
(2) Coast regions mild and pleasant
(3) Uneven rainfall

VII. Vegetation

(1) Peculiarities of plant life
(2) Semi-desert and tropical types
(3) Introduction of European plants

VIII. Animal Life

(1) Interesting and peculiar species
  (a) Few higher types
  (b) Marsupials; mammals of primitive class only
(2) Peculiar and varied species of birds
(3) Reptiles and fish

IX. Industries

(1) Rich mineral resources
(2) Farming
(3) Stock-raising
(4) Manufactures

X. Inhabitants

(1) Aborigines
(2) Whites
(3) Uneven distribution of population
  (a) Cities
(4) Immigration
(5) Education

XI. Improvements and Commerce

(1) Railroads
(2) Telegraph and telephone systems
(3) Cable communication
(4) Trade

XII. Government

(1) Federation of states
(2) Nominal British control
(3) Universal suffrage
(4) Departments of government
  (a) Executive
  (b) Legislative
  (c) Judicial

XIII. Defense

(1) Compulsory training
(2) Australian navy
(3) Part in the War of the Nations

XIV. History

(1) Colonial Period
  (a) Exploration and colonization
  (b) Discovery of gold
  (c) Steps toward federation
(2) The Period of Federation
  (a) Tariff question
  (b) Exclusion of Asiatics
  (c) Progress and development

Questions

What was Australia called one hundred years ago?
Where does Australia rank as to size among the possessions of Great Britain?

Outline and Questions on Australia—Continued

If you were sailing from San Francisco to Sydney, what waters would you pass through? In going from Liverpool to Sydney?

Who are the Anzacs?

What city in the western hemisphere is most nearly in the latitude of Sydney?

What point in America corresponds in north latitude to the position of the southern coast of Australia in south latitude?

Does the equator cross Australia? Does either of the Tropics?

What characteristic have the Australian natives that shows they are not negroes?

How does a study of the animals prove that Australia has long been an island?

What steps has the Commonwealth taken toward having a beautiful capital?

Is Australia as far from South America as South America is from Africa?

What effect has Australia's position had on its vegetation?

How do geologists rank Australia as to age among the lands of the world?

What peculiarity have most of the mammals of the continent?

Who were the first settlers of Australia?

What is the attitude toward immigration?

How does Australia prove the falsity of the statement "All mammals bear their young alive"?

What effect did the War of the Nations have on Australia's wool trade with the United States?

What is the "bush"? What is wattle?

In what stage of civilization are the native peoples?

How large a proportion of the population is made up of them?

How does the date of the great gold rush compare with that in California?

What effect did it have on the history of the country?

What tiny forms of animal life had much to do with making navigation dangerous along the northeast coast of Australia?

How does the density of population in Australia compare with that in Canada?

How has the plant life adapted itself to the arid conditions?

What effect, if any, has the climate had on the distribution of population?

If the entire population of Australia were removed to Queensland would the average density be greater or less than that of the United States?

How does the altitude of the highest peak compare with that of the highest point in Africa? In North America?

How do Australians give support to the British navy?

What progressive system coming into favor in Canada and the United States originated in Australia?

What fruit trees are native to the continent?

How does the head of the government obtain his office?

How is religious instruction given in the schools?

In what direction does the great interior region drain?

How close a supervision has the government over the railroads?

What radical pension system has been adopted?

What is the final court of appeal? Under what circumstances may it be called upon to act?

How does the constitution resemble that of the United States and differ from that of Canada?

Why has Australia special need of good railway communication?

Are people of all races welcomed in Australia?

as 1849 tentative steps were taken in that direction. Not until 1885, however, when a Federal Council was established, was anything definite accomplished, and not all of the colonies joined in this. This body was merely advisory, and could not control matters in any colony.

A national convention held at Sydney in 1891 proposed a union and mapped out the main lines on which it should be organized, but it was six years later before a constitutional convention was actually assembled. The constitution was submitted to the people of the various colonies in 1898, and two years later, after having been approved by the people, was submitted to the Parliament of Great Britain. Approved by that body and signed by Queen Victoria, it went into effect January 1, 1901. The Northern Territory was at that time a part of South Australia, from which it was separated ten years later. The first Commonwealth Parliament met at Melbourne in May, 1901, and at once entered upon a struggle over the tariff question. Finally, after months of conflict, a protective tariff bill was passed, and the protectionist party has been in the ascendancy during most of the succeeding period. One feature of legislation has been a determined effort to keep out Asiatics, that a "white Australia" may be maintained. Merchants, students and tourists of other races may enter the country and remain for a time, but none but whites may make their permanent homes there.

The Commonwealth is a country of opportunities and of promise. Such questions as the conflicts between capital and labor, the up-keep of roads, the assisting of agriculture by reduction of freight rates and by the transportation of cattle in times of drought have received careful attention. Farmers who wish to introduce new crops or establish new industries, such as the manufacture of dairy products, may receive assistance from the government, as may those who find their crops threatened by disease or insect pests. After all the years during which it was first a land of myth and later a land of wild adventure, where gold-seekers and bush-rangers lived their perilous lives, Australia has become a settled, self-governing country, ready to take its place among the intelligent, progressive nations of the world. G.G.

Other Items of Interest. The Torrens system of land registration, which is gradually supplanting others in Canada and the United States, came from Australia. It is explained in another volume of this set.

During the War of the Nations the name *Anzacs* was given to the men of the Australia-New Zealand Army Corps, the word being derived from the initials of the longer name. A town in the peninsula of Gallipoli was called Anzac during the Dardanelles campaign.

Darwin visited Australia on the journey described in *The Voyage of a Naturalist on H. M. S. Beagle,* and obtained some of the knowledge which led to his great work on the *Origin of Species.*

The territory of Papua, or British New Guinea, is controlled by Australia. In 1914 the adjoining district, German New Guinea, was seized by Australian troops, as were also the Bismarck Archipelago to the northeast and Germany's share of the adjacent Solomon Islands.

The proportion of divorced persons to married persons is less than a third of what it is in the United States, but perhaps twenty times as great as in Canada.

Though the island-continent contains fewer people than Canada, it has two cities larger than any in Canada. Sydney, with its suburbs, is believed to have nearly three-quarters of a million inhabitants, and Melbourne over 650,000. Adelaide's population is about 200,000; Brisbane's 150,000; Perth's, 100,000.

Only 3.4 per cent of the white population five years of age and over are illiterate. In Canada the percentage is 10.5, and in the United States 7.7 per cent of those ten years and over cannot read or write.

Since 1909 the Commonwealth has had a system of old age pensions. Previously such pensions had been paid in New South Wales, Queensland and Victoria. Only three governments, Germany, Denmark and New Zealand, introduced the measure earlier.

The British system of pounds, shillings and pence is in use.

Five counties in the Northern Territory have been named for British statesmen—Disraeli, Gladstone, Malmesbury, Palmerston and Rosebery.

Australia's copper output is less than one-tenth that of the United States; it is exceeded by Japan, Mexico and Spain.

Many Australians are great athletes. Their teams have more than once held the Davis Cup, emblematic of the world's championship in tennis, and their crews have won the Grand Challenge Cup of the Henley Regatta, in Eng-

land. The *crawl,* the fastest stroke in swimming, was introduced from Australia, and one variety of it is still known as the Australian crawl.

Before the War of the Nations Australia sent the United States only eight to eighteen per cent of the latter's imported first-class wool, less than either Argentina or Great Britain. In 1915, however, Australia led all with 66,000,000 pounds, thirty per cent of the total.

Consult Fraser's *The Making of a Nation;* Lloyd's *Newest England (Australia and New Zealand);* Rowland's *The New Nation.*

Related Subjects. The reader who wishes to acquaint himself more fully with conditions in Australia will find the following articles helpful:

CITIES AND TOWNS

Adelaide	Melbourne
Ballarat	Newcastle
Brisbane	Perth
Hobart	Sydney

COAST WATERS

Botany Bay	Indian Ocean
Coral Sea	Pacific Ocean
Great Australian Bight	

ISLANDS

New Guinea	Norfolk Island
	Tasmania

RIVERS

Cooper's Creek	Murray
Lachlan	Murrumbidgee

STATES

New South Wales	Tasmania
Northern Territory	Victoria
Queensland	Western Australia
South Australia	

PECULIAR ANIMALS

Bandicoot	Kangaroo
Bower Bird	Lyre Bird
Cassowary	Opossum
Dingo	Parrot
Duck-billed Platypus	Swan
Echidna	Tasmanian Wolf
Emu	Wombat

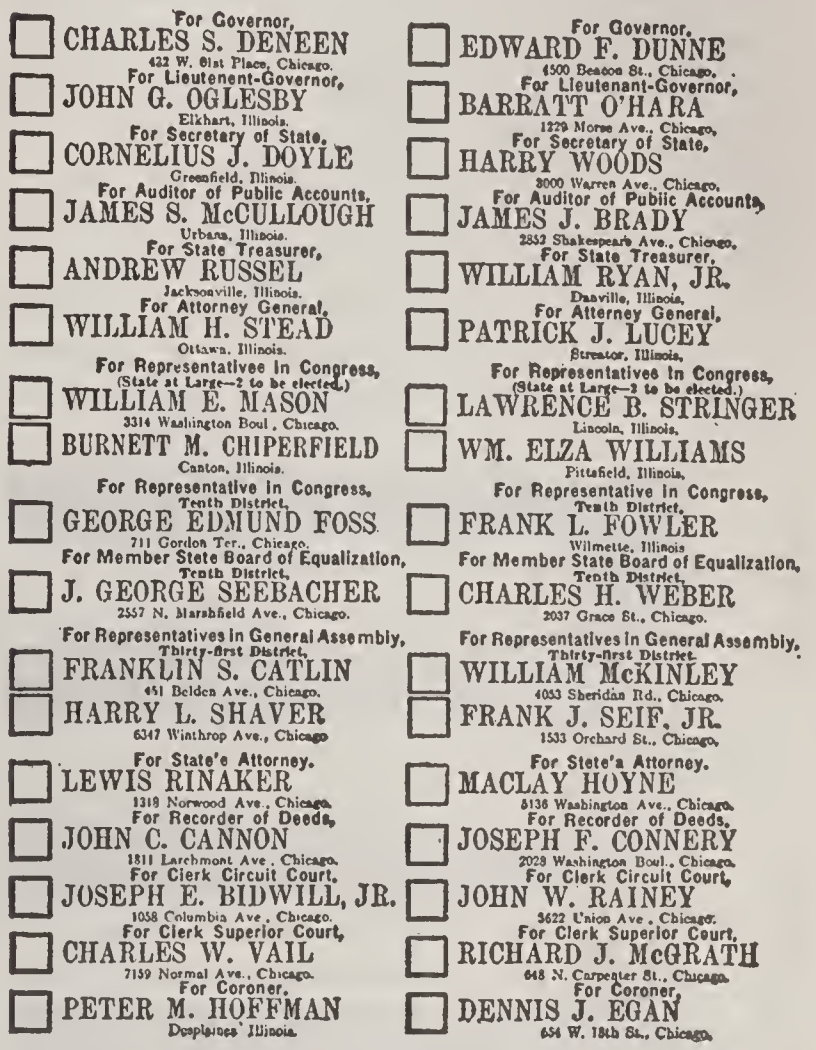
PLANT LIFE

Acacia	Eucalyptus
Bamboo	Myrtle
Bottle Tree	Palm

LEADING PRODUCTS

Cattle	Sheep
Copper	Silver
Gold	Sugar Cane
Olive	Wheat

AUSTRALIAN, *aws tray' li an,* **BALLOT,** a system of voting whose essential features are absolute secrecy in the expression of the voter's choice, and the use of official printed ballots supplied by the state, provincial or local authorities. It was first used in Australia in 1856 and has since spread to practically all the civilized nations of the world. Before the introduction of the Australian system it was customary for each candidate to have his own ballots printed, and to distribute them to the voters before they entered the polling place. Under this system bribery and fraud were common. Dishonest politicians were often bold enough to bribe voters and follow them to the ballot box to see that the vote paid for was actually cast.

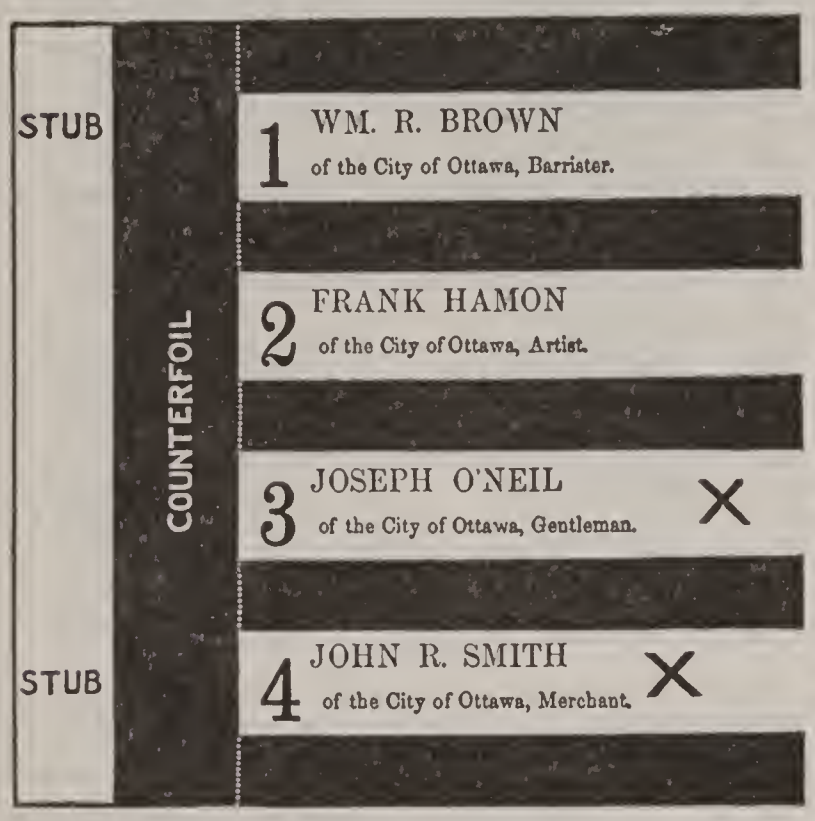


AUSTRALIAN BALLOT IN THE UNITED STATES

Part of Republican and Democratic columns; other columns for minor political parties, if any, would appear at right.

Marking the Ballot. In the system as provided in the United States the names of the candidates for office are arranged in columns under the heading of their respective parties. It is customary to place all the candidates of each party in the order of the importance of their office. Thus, in a state election, first

comes the governor, then the lieutenant-governor, then the other state officials, and finally the local officers to be chosen. At the left of the party's name at the head of the column is a circle, and if the voter wishes to vote for all of the candidates of that party he may put a cross (×) in the circle. This is called "voting a straight ticket." If, on the contrary, he wishes to vote for some candidates of one party and some of another, he must put a cross in the square at the left of the name of each man for whom he wishes to vote. This is called "scratching" or splitting the vote or ticket. In a newer form of ballot all party designations are absent and the candidates' names are arranged in alphabetical



THE AUSTRALIAN BALLOT IN CANADA

Ballot papers are kept in a book in each polling division, and contain a *stub* (white perpendicular space shown above) and a *counterfoil* (black perpendicular space shown above). Both the stub and counterfoil are numbered on the back, and are separated from the ballot paper by a line of perforations between the counterfoil and the stub, and between the counterfoil and the ballot paper. The stub is separated when the voter receives the paper, and its number is compared with that on the counterfoil when the vote is given.

order. In Canada the system is slightly different in detail, and is explained in the description under the illustration of Canada's sample ballot.

Counting the Ballots. When the voter receives a blank ballot from one of the judges of election a mark is placed after his name on the list of registered voters. He then enters a curtained booth, where he may mark his ballot without interference. The laws of most countries and smaller political divisions, however, allow one of the election officials to assist an illiterate voter if the latter requests it. When the voter has marked his ballot he must fold it in such a way that none of his marks can be seen, but the identification marks previously placed upon it by the judge must be visible. The judge then drops it into the ballot box and the voter's name is entered on the poll books by the clerks. When the polls are closed the ballots are removed from the box and are counted by the judges of election. Any ballots which were not initialed or otherwise marked by an official must be thrown out, because they could have been put into the box only by some unauthorized person. Ballots improperly marked are also not counted.

Greater Honesty in Elections. Under the Australian ballot system most of the elements of fraud are removed. A voter can secure a ballot only after he enters the polling place, and he marks his ballot free from observation. There is no mark on any ballot to show who cast it. Bribery and fraud, however, are still possible with the consent of the election officials, but honest, fearless judges and clerks of election have it in their power to prevent nearly all fraud in the casting or counting of ballots.

Spread of the Australian Ballot. This form of ballot was first used in South Australia in 1856, and later in the same year was introduced into several other of the Australian colonies. For more than a decade little attention was given to the new plan by other governments, but finally in 1869 it was given a trial at Manchester, England, and in 1872 was definitely established by act of Parliament. Shortly afterward it was introduced into Canada, but for a decade no serious attempts were made to establish it in the United States. A Wisconsin law of 1887 had some features of the Australian system, but the first complete law was that of Massachusetts in 1888. The Presidential election of 1888 was marked by an unprecedented amount of fraud, one result of which was the adoption of the Australian ballot by nine states in 1889. The system is now used in all states of the Union and in all the provinces of Canada. See VOTING MACHINE.

W.F.Z.

AUSTRIA, *aws' tri a.* This name, which is taken from a German word meaning *Eastern Empire,* has at different times in the past thousand years been used to denote various territories; but all of these have had a common center. To-day when the name is used

it is with a significance never before attached to that country, for the Austria of former and sometimes glorious periods is no more. In 1914, when it and its powerful German ally plunged the world into a war lasting almost five years,

AUSTRIA IN 1914

The form of Austria was more irregular than that of any other country in the world. It is shown in solid black in the illustration.

Austria, exclusive of Hungary, which was an integral part of the dual monarchy, contained 115,831 square miles. When the War of the Nations ended with complete disaster to Germanic arms Austria was dismembered, its proud domain was reduced to 30,766 square miles by the formation of new independent states based on racial lines, and its young emperor was a fugitive. It may be described now as a small inland state, outranked in population and wealth by the states that have been formed out of, or enlarged by, its former dominions (see map of new states, in article AUSTRIA-HUNGARY).

The Austria of the past included Upper Austria and Lower Austria as its principal divisions, but attached to the empire were Salzburg, Styria, Carinthia, Carniola, Trieste, Istria, Tyrol, Vorarlburg, Bohemia, Moravia, Silesia, Galicia, Bukowina and Dalmatia. The racial map in the article AUSTRIA-HUNGARY shows how loosely the parts of the country were held together. There was no common language; there were no common interests; there was little national patriotism.

When the empire crumbled the Tyrol and Istria were returned to victorious Italy; Trieste was claimed by Italy, but that disposition of it was strongly contested by the new Jugo-Slav state. Eastern Galicia, in which Ruthenians were most numerous, joined the Ukraine, a new Russian state not yet well established; Western Galicia, composed largely of Poles, desired admission to the new republic of Poland. Dalmatia became a subject of dispute between Italy and Jugo-Slavia. Bukowina was desired by Rumania as a part of its reorganized and enlarged state. The Jugo-Slav state, recognized as an independent nation by the powers at the peace conference in 1919, took but little Austrian territory; it greatly reduced Hungary. Bohemia, Slovakia and Moravia united to form the new Czecho-Slovak Republic, possibly the most ambitious of all the new states formed in Central Europe.

Territorially, the treaty of peace presented to Austria to sign did little more than to record facts already accomplished. Two grievances were voiced by the stricken nation. The first was that the treaty did not permit Austria to join Germany as German Austria; such action was denied because the strengthening of Germany which would result from such a union might prove dangerous in the future and therefore was not desired; there was also a determined feeling among the allies that Germany, itself shorn of territory, should not be allowed to think it had won anything out of the war as compensation for defeat. The second grievance related to the great loss of territory. Austria is now smaller than South Carolina and is reduced from over 28,000,000 people to a population of 6,131,445 (1920). Divisions along racial lines and new nationalistic aspirations made this shrinkage inevitable.

A concrete statement of Austria's losses and penalties arising from its defeat in the war are best considered in connection with the entire former empire, and it will be found in the article AUSTRIA-HUNGARY.

The physical features of Austria are in part described in the articles dealing with the newly-formed states, but a better understanding of that part of the continent will be derived from a general summary covering all of former AUSTRIA-HUNGARY; therefore in the article on the former dual monarchy this broader view is presented.

The New Government. The dynasty of Austria boasted descent from the days of imperial Rome, and its aristocracy reflected with pride on its long line of powerful Hapsburg monarchs. The country had been held together by the military power of its strong rulers and astute statesmen. The sudden transition to a weak republic plunged the country into a chaotic condition; political equality had been the centuries-old hope of the people, but this was difficult to put into effect when they found themselves suddenly without a strong, centralized and militaristic government.

A republic was proclaimed soon after the abdication of the emperor, but its existence was threatened almost daily. Bela Kun, a Hungarian and a follower of the Trotzky-Lenine regime in Russia, had wrested the power of the state in the new Hungary, and from Budapest threatened to extend bolshevik rule to Austria by means of insidious propaganda and red terror so effective in Russia, but the Austrians appeared to withstand successfully the "red" pressure. In June, 1919, the Austrian peace delegation, headed by the Chancellor of the new government, Karl Renner, was called to Paris to sign the treaty which would close the war. There were practically no surprises in store for the members, for they already knew from the trend of events the fate that awaited them.

History. The history of Austria was throughout the Middle Ages and early modern period confused with that of Germany, and for a large part of that time was identical with that of the Holy Roman Empire (which see).

In 796 Charlemagne drove the Avars from the territory between the Enns and the Raab,

FROM 1810 TO 1814

two tributaries of the Danube, and united it to his empire as a margravate, or border province; and it was this little province which was the nucleus of the present Austrian Empire. After the invading Hungarians had been driven out (see HUNGARY, subhead *History*) it was more firmly established as a part of the old German empire, and acquired the name of *Oesterreich,* or Eastern Realm. In 1156 the margravate was enlarged and created a duchy, and from that time on there were frequent accessions of territory, with corresponding increase in the power of the dukes. In 1284 Ottokar, one of the strongest in the line of dukes, ventured to resist the authority of the emperor, Rudolph of Hapsburg. Ottokar was killed during the struggle, and in 1282 Rudolph assigned the territory to his own sons, Albert receiving Austria and Rudolph Styria. From that time until the present the Hapsburgs have ruled Austria.

During the two centuries that followed, the duchy was constantly disturbed by wars, either with rebellious subjects or with neighboring provinces, but it grew steadily and increased its influence. Albert V, son-in-law of Emperor Sigismund, became king of Bohemia and Hungary, and in 1438 was chosen emperor as Albert II. But Hungary became independent in the next generation, and under its patriot king, Matthias Corvinus, took Vienna in 1485, and temporarily drove the Hapsburgs from Styria and Carinthia. So great, however, had become the power of the Austrian house in Germany that from this time on the Hapsburgs were almost always able to have themselves chosen Holy Roman Emperors.

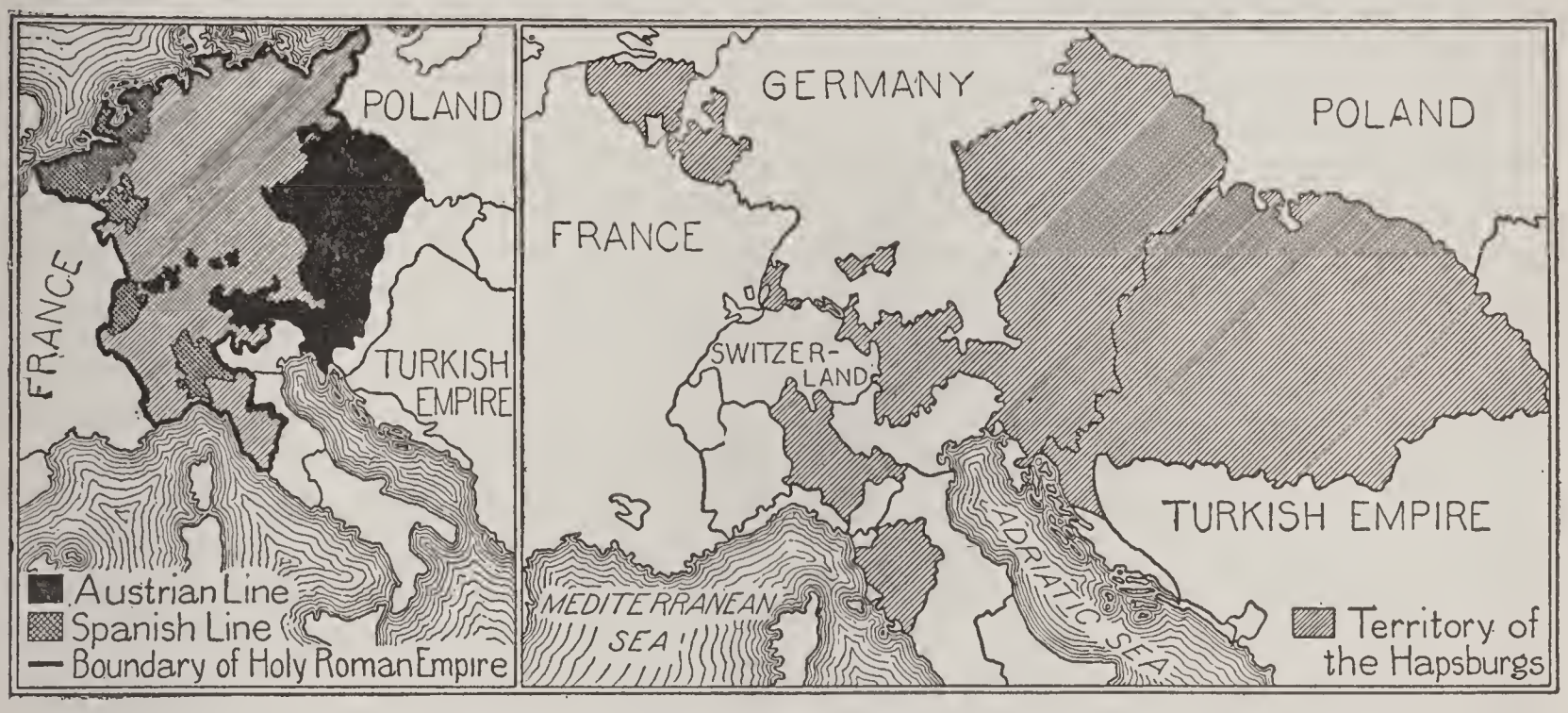
In 1453 Austria was made an archduchy, and gradually, by marriage or inheritance, Spain and the Netherlands came for a time under the same rule, so that Charles V (which see) was ruler of the greatest domain in Europe. His brother Ferdinand, who inherited Austria, spent most of his life fighting the Turks, who in 1530 penetrated as far as Vienna, and exacted an annual tribute for Austrian rule over Hungary. The late sixteenth and early seventeenth centuries were much disturbed by struggles for liberty, religious and political, on the part of Hungary and Bohemia, and the resentment of the latter country at having to accept as king the Catholic Ferdinand brought on the Thirty Years' War (which see). During the reign of Leopold I, grandson of Ferdinand, there was war with Sweden. Later the Turks, invited by Hungarians, again reached Vienna, but were driven back by King John Sobieski of Poland, and permanently forced beyond the Danube by other allies of Austria. It was during this king's time, too, that the question of the succession to the Spanish throne culminated in the great War of the Spanish Succession. (See SUCCESSION WARS, subhead *War of the Spanish Succession.*) Joseph I succeeded to the imperial

throne during this war and, dying before its close, was followed by Charles VI. The treaty at the close of the war was largely favorable to Austria, which came into possession of the Spanish Netherlands, Milan, Naples and Sardinia; but in 1720 Sardinia was exchanged for Sicily, and fifteen years later, after the War of the Polish Succession, both Naples and Sicily were lost, and more territory in Northern Italy gained.

Charles VI tried by the Pragmatic Sanction (which see) to secure the throne for his daughter, Maria Theresa, but she was obliged to fight for her possessions with Frederick the Great (which see). She lost Silesia and part of Italy, and in the Seven Years' War unsuccessfully attempted to recover the former. In 1772 Maria Theresa shared in the first partition of Poland. Her husband, Francis I, was succeeded as emperor by his son Joseph II, who ruled in Austria jointly with his mother, and who attempted to push through many reforms for which the people were not ready (see MARIA THERESA). Joseph was on the throne when the French Revolution broke out, followed by revolt in Belgium. Leopold II, a statesmanlike ruler, succeeded. As head of the Holy Roman Empire he planned to crush radical republicanism in France, but died before his plans could be fully matured. His son Francis, who came to the throne in 1792, attempted to carry out his father's projects. He also shared in the third partition of Poland.

In the first war with the French revolutionists, Austria, defeated by the young General Bonaparte, lost Belgium and the region about Milan, Italy, but was permitted to seize Venice, hitherto independent. When Bonaparte was absent in Egypt, Francis again attacked; Bonaparte returned, defeated the Austrians, and obliged them to give up Tuscany. In 1804, when Napoleon took the title of Emperor of the French, Francis replied by calling himself *Hereditary Emperor of Austria.* Two years later, after having been crushed at Austerlitz with the loss of Venice, Dalmatia and Istria, and having witnessed Napoleon's founding of the Confederation of the Rhine, he renounced the title of *Holy Roman Emperor.* In 1809 Francis again took up arms against Napoleon, and as a result lost Trieste and other Adriatic territory, the Tyrol and West Galicia. In the following year, through the marriage of Napoleon with Maria Louisa, daughter of Francis, Austria entered into nominal alliance with Napoleon, but deserted him in 1813 to join in the campaigns which caused his downfall.

From this time till 1848 the dominating figure in Austrian affairs, and to a large extent in those of all Europe, was Prince Metternich. In the Congress of Vienna Austria refused to take back Luxemburg and Belgium, but in compensation received Venice and its Adriatic territory and practical domination over all Italy north of Rome. Metternich's policies, which included the suppression of all liberal tendencies, did not help to solve the three great problems of nineteenth century Austria—Italy, the Slavs and Hungarians, and influence in Germany.



GROWTH OF THE FORMER EMPIRE

At left: Austria and the Holy Roman Empire under Charles V, who was also king of Spain. At right: Austria and the dominions of the Hapsburgs in 1740, at the accession of Maria Theresa.

In Italy there was trouble from the start. Before Napoleon the Italians had been content under the rather benevolent Austrian dominion, but the new generation included such patriots as Mazzini, whom the Bonaparte revival of Roman rule had set dreaming of a new and united Italy. Metternich's reply to their aspirations was the attempt to Germanize Italy. Many Italian leaders were arrested and confined in fortresses like the Spielberg, whose unspeakable horrors are told in *My Prisons,* the personal reminiscences of a famous Italian author, Silvio Pellico. In 1820 the people of Naples forced their Bourbon king to grant them a constitution, whereupon Metternich sent an army and occupied the country. Another army helped crush the revolutionists in the kingdom of Piedmont.

While the flame of national sentiment in Italy was thus being fanned, the same spirit was growing in Austria itself, in a much more complex way. In 1828 Hungary revived its old constitution and reintroduced the Magyar language; Bohemia followed with attempts to reinstate the Czech tongue; the Slavs, in the South, began a similar effort. In 1846 the Galicians, who are Poles, rebelled. Two years later came revolutions in Hungary, in Bohemia, in Vienna itself. Metternich resigned and fled. When the news was brought to Italy the people of Milan and Venice drove out the Austrian garrisons, and the king of Piedmont, in the name of all Italy, declared war, thus beginning the movement which made modern Italy and later involved Italy in the War of the Nations. In Hungary the revolt was crushed by the soldiers of the Russian czar, in Bohemia by the Austrians themselves; in Vienna it resulted in the abolition of feudal service for Austrian peasants and the abdication of the Emperor Ferdinand in favor of his nephew, Francis Joseph, who ruled to November 21, 1916. The Italians were defeated, but in 1859 they won Lombardy.

From the time of Napoleon's fall, Austria had struggled with Prussia for domination in the German confederation. Though the latter power had gained influence by its presence in the Customs Union, from which Austria was excluded because the other members did not want Hungary and Italy in their ranks, Austria maintained its traditional leadership until, through the Schleswig-Holstein question and the intrigues of Bismarck, it was drawn into the Seven Weeks' War of 1866. Italy attacked at the same time as Prussia, and the result of the conflict to Austria was the loss of Venice and exclusion from the political affairs of Germany. The question of Austro-German relations has, however, been revived by the War of the Nations, as told in the story of Austria-Hungary.

Austrian defeat left Hungary in a position to dictate regarding the internal affairs of the country. In 1861 the Hungarian Parliament had been abolished, but now came the *Ausgleich,* or Compromise, of 1867, which gave Hungary legal equality. The affairs of Austria since that date are told in the article AUSTRIA-HUNGARY. Since 1848 Austria had encouraged the rivalry of the Magyar (Hungarian) and Slav races within the monarchy, in order to maintain supremacy of the German element. In the *Ausgleich,* however, the Slavs, actually a majority in the whole country, were divided between the kingdoms of Austria and Hungary, to form a minority in each, and thus were held in check.

E.D.F.

For index of related topics, see AUSTRIA-HUNGARY.

AUSTRIA-HUNGARY, or the AUSTRO-HUNGARIAN MONARCHY, also called the DUAL MONARCHY, was an important country of Central Europe until November, 1918. While known under one name it was really a group of states, inhabited by people of many nationalities and conflicting racial sympathies, the whole bound together only by the fact that one sovereign was supreme ruler of them all. It was not really a nation, in the sense that

France, for example, is a nation, and its inhabitants were not a distinct people known as Austrians or Austro-Hungarians, as the people of France are Frenchmen.

The history of Austria-Hungary as one country dates back only to 1867 (see *History,* below). While it occupied a comparatively large area among the countries of Europe, it never achieved the world-importance of its neighbors. It was largely shut in, and most of its people were near to poverty. Very soon after its organization by the union of Austria and Hungary and various smaller units it fell under the influence of its more powerful and inordinately ambitious neighbor, Prussia, at the north. Indeed, in 1866, Austria had been defeated in the Seven Weeks' War with Prussia, and its prestige was greatly weakened, while Prussia's success made it the all-powerful state of the German Empire in 1871. Therefore from the beginning of Austria-Hungary's history the dual monarchy was overshadowed in power by its northern neighbor, and on the east the vast Russian Empire was immensely more powerful.

The area of the dual monarchy was 261,241 square miles. Only Russia was larger among the countries of Europe. It was 52,416 square miles larger than the German Empire of the same period, and it was 54,113 square miles larger than France. Compared with American units, it was a little smaller than Texas, and slightly larger than the province of Alberta. As against Alberta's population of less than 500,000, and nearly 4,000,000 in Texas, Austria-Hungary had in 1910 a population of 51,390,223. It therefore had an average of about 195 people to the square mile, or over six times the density of population of the United States and ninety-seven times the density of Canada's population as a whole. Lower Austria averaged more than 400 people to the square mile.

The End of Austria-Hungary. The War of the Nations, which changed the map of Europe and threatened the economic foundations of the world, so completely destroyed the dual monarchy that no suggestion of it remains, except in the names retained by two very small and weak independent states which yet call themselves Austria and Hungary. As to these, neither political nor racial ties now bind them.

The war was set in motion by Austria-Hungary in midsummer of 1914, after it had savagely arraigned the small state of Serbia for alleged instigation of the murder of the dual monarchy's heir to the throne. The influence of Germany was behind the aged Austro-Hungarian emperor, Francis Joseph, it has since been proved.

Details of the monstrous war are given in the article War of the Nations. It is only necessary to record here the complete defeat of the German-Austrian-Turkish-Bulgarian alliance, in November, 1918, at the hands of the allied and associated powers, headed by Great Britain, France, the United States and Italy. Emperor William, the German crown prince and over three hundred petty rulers and royal personages in Germany fled the country or disappeared in other ways from seats of power; the Bulgarian king abdicated. Emperor Charles of Austria, who had succeeded to the throne on the death of Francis Joseph, in the midst of the war, in 1916, was driven from Vienna and ultimately from the country, finding asylum in Switzerland.

The dismemberment of the empire was inevitable. The Czecho-Slovaks in Bohemia, Moravia and Northern Hungary, an intelligent, ambitious people, formed the Czecho-Slovak republic, with a wise man, Professor Thomas Masaryk, as its President. In the southern part of the old dual monarchy the Jugo-Slavs racially united to form Jugo-Slavia, and they reared their political structure out of a part of Southern Austria, and a large portion of Southern Hungary; it also included the provinces of Croatia, Slavonia, Bosnia and Dalmatia. Independent Serbia expected to become an important part of this new state. However, Italy's demands clashed with the ambitions of the Jugo-Slavs, and the fate of certain divisions of land on the Adriatic Sea may remain for some time undetermined. Galicia chose to divide its territory, the eastern part joining the Russian Ukraine, the western to become a part of Poland. Southeastern Hungary, as it formerly existed, was to be disposed of by the League of Nations; Rumania demanded Bukowina, Transylvania and the Banat as a part of its enlarged domain, and this disposition of these provinces may be made in due time.

The Treaty of Peace. After the war Hungary seceded from Austria, and Austria was considered by the allied and associated powers as the country with which formal peace should be signed after the conclusion of the peace pact with Germany. Accordingly, the Austrian peace delegation was summoned to Paris (Versailles) in June, 1919. No surprises were in store for the visiting enemy delegates. The harsh but admittedly just terms imposed on Germany, known to the world for three months, had prepared the officials of the former dual

AUSTRIA-HUNGARY AS IT WAS; AUSTRIA AND HUNGARY AS THEY ARE

The shaded portions show the extent of the dual monarchy before the war; the black portions include the territory now left to the two countries. Disposition of eastern section to be determined by the League of Nations.

monarchy to expect severe penalties in their case. Indeed, what the entente demanded had in great measure already become accomplished facts in the new independent states.

The terms presented to the Austrians are summarized as follows:

(1) Complete acceptance of decisions relating to disposition of territory.

(2) Recognition of the independence of Hungary, Czecho-Slovakia and Jugo-Slavia.

(3) Recognition of the independence of all Russian territory and respect for its independence.

(4) Agreement to accept all principles of the covenant of the League of Nations, although not to be admitted as a member of the League.

(5) Complete demobilization of all land, naval and aerial forces.

(6) Recognition of the right of the allied and associated powers to try those guilty of violations of military laws during the war.

(7) Agree to make compensation for all damages arising from personal injury to civilians caused by acts of war, including aerial bombardments.

(8) Assure complete protection of life and liberty to all its inhabitants.

(9) Agree not to impose the slightest restrictions on the use of any language.

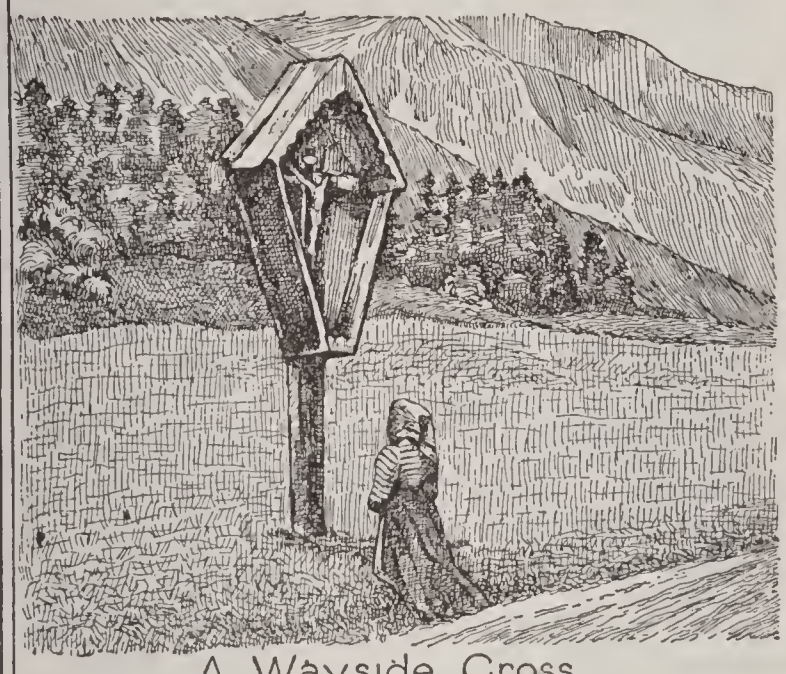
(10) Abandon all claims for damages.

The Old Dual Monarchy. *Physical Characteristics.* The physiography of the former dual monarchy should be described here, even though the country has been divided into various independent political groups. Articles in these volumes relating to the new countries do not describe surface features; a better knowledge of configuration can be obtained from the wider descriptions which appear below. It will also be of interest for many years to know of the material progress of the former historic monarchy, and the facts of industrial life cannot be clearly comprehended if examined apart from physical features.

The Land and Its Waterways. This second largest of European states as it existed until the end of the war had the shortest coast line of any of the large countries of the continent, and it was entirely lacking in colonial possessions, two facts which admit of correlation.

IN THE FORMER DUAL MONARCHY

Hungarian Parliament at Budapest



A Wayside Cross

A Village Scene

The Arena at Pola

A Local Costume

Austrian Parliament at Vienna

Peasant Girl

States Which Composed the Monarchy. The United States and Canada are made up of states or provinces, but those countries can give no adequate idea of the composition of Austria-Hungary, for each one of the numerous Austro-Hungarian provinces was once a sovereign state, and they were brought together merely by force of circumstances and not by any real bond of unity. The first great division was into the Austrian Empire and the Hungarian Kingdom, the former with 115,831, and the latter with 125,641 square miles. Hungary was fairly compact, but Austria, with its various provinces, was spread in a sort of crescent shape about Hungary. Bosnia and Herzegovina, after 1908 an integral part of the monarchy, had a combined area of 19,767 square miles.

The striking peculiarity of its surface is the prevalence of high land, for Austria-Hungary was more mountainous than any other part of

LOCATION MAP OF OLD AUSTRIA-HUNGARY

Europe except Switzerland. The western provinces were practically covered by spurs of the Alps, and though the mountains nowhere attain the height of the greatest Swiss peaks, still several summits rise to almost 13,000 feet, and the Tyrol, the most westerly province, is scarcely second to Switzerland in the beauty of its scenery.

The other chief mountain range is the Carpathian, which swept in a great curve 800 miles in length about the northern and eastern boundaries of Hungary; they rise at times to a height of over 8,000 feet. Elsewhere, too, lesser mountain regions are found, the Adriatic being bordered by a highland which makes of the coast a region of marvelous scenic beauty. Several of the smaller provinces had basin-like hollows within their mountain boundaries, but only in Hungary was there a level region of any extent. There, within the curve of the Carpathians, lies a great plain of over 30,000 square miles, as flat as the Mississippi Valley prairie region, and as fertile.

About three-fourths of the entire country was drained by the Danube River system—the greatest in Europe save the Volga; and it is difficult to estimate what has been the effect of this river system on the history of the country (see subhead *Transportation,* below). The Theiss, Drave and Save are all tributaries of the Danube, while the Elbe and the Vistula flow northward, and the Adige flows through Italy into the Adriatic. Of lakes Austria had few of any importance, but the little crystal-clear lakes of the Alps, thousands of feet above sea level, helped to make that region one of the most picturesque in all Europe. Hungary had the Platten See, the largest lake of Southern Europe.

Climate and Agriculture. Though one of the most southerly countries of continental Europe, Austria-Hungary ranged in latitude from about that of Chicago to a point a little north of Winnipeg, or from 42° to 51° N. The climate is for the most part mild, but the considerable differences in altitude give a wide range of temperatures, the yearly average varying from 48° in the extreme northern part to 62° in the southern. In southern Dalmatia, on the Adriatic coast, tropical plants, which in America's greatest cities could be raised only in greenhouses, may be grown out-of-doors.

The rainfall, like the temperature, varies greatly in different parts of the country. In some of the western mountainous regions it is more than 100 inches a year, while in Lower Austria, Moravia and Silesia it is not more than one-fourth as much. Everywhere, however, there is sufficient moisture for agriculture.

Agriculture is the most important industry of all this area. The variations in surface and in rainfall permit the successful production of a large number of crops, including some which are subtropical, as the orange and the olive. Austria-Hungary was often spoken of as the granary of Europe. The great plains of Hungary produced more corn than was grown in any other European country. The dual monarchy's wheat crop was exceeded only by Russia and France, its oats by Germany and France, its barley by Russia and Germany,

and its rye by Germany alone. Until 1915 the wheat yield was always greater than that of Canada; more than two-thirds was grown in Hungary, but Austria led its partner in oats and rye. Next to Russia, Hungary was also the best tobacco country of Europe, and Austria was exceeded by no nation in the world except Germany and Russia in the production of sugar beets. In fact, Austria-Hungary's exports of sugar in normal times was equalled by none of the cane-sugar countries except Cuba and the Dutch East Indies. Its production of potatoes was nearly twice that of the United States. Vine culture, too, was extensive, the mountain slopes furnishing excellent sites, and Austria-Hungary was one of the important wine-producing countries of Europe.

In the plains of old Hungary and among the highlands of the Alps are extensive grassy stretches which afford fine grazing land; but though stock-breeding had been brought to a high state of perfection the monarchy had no more than enough cattle to satisfy its own demands. Austrian horses were far-famed, and were surpassed by those of few other localities; this is in part accounted for by the fact that the government took great interest in the breeding of horses that it might have perfect mounts for its cavalry.

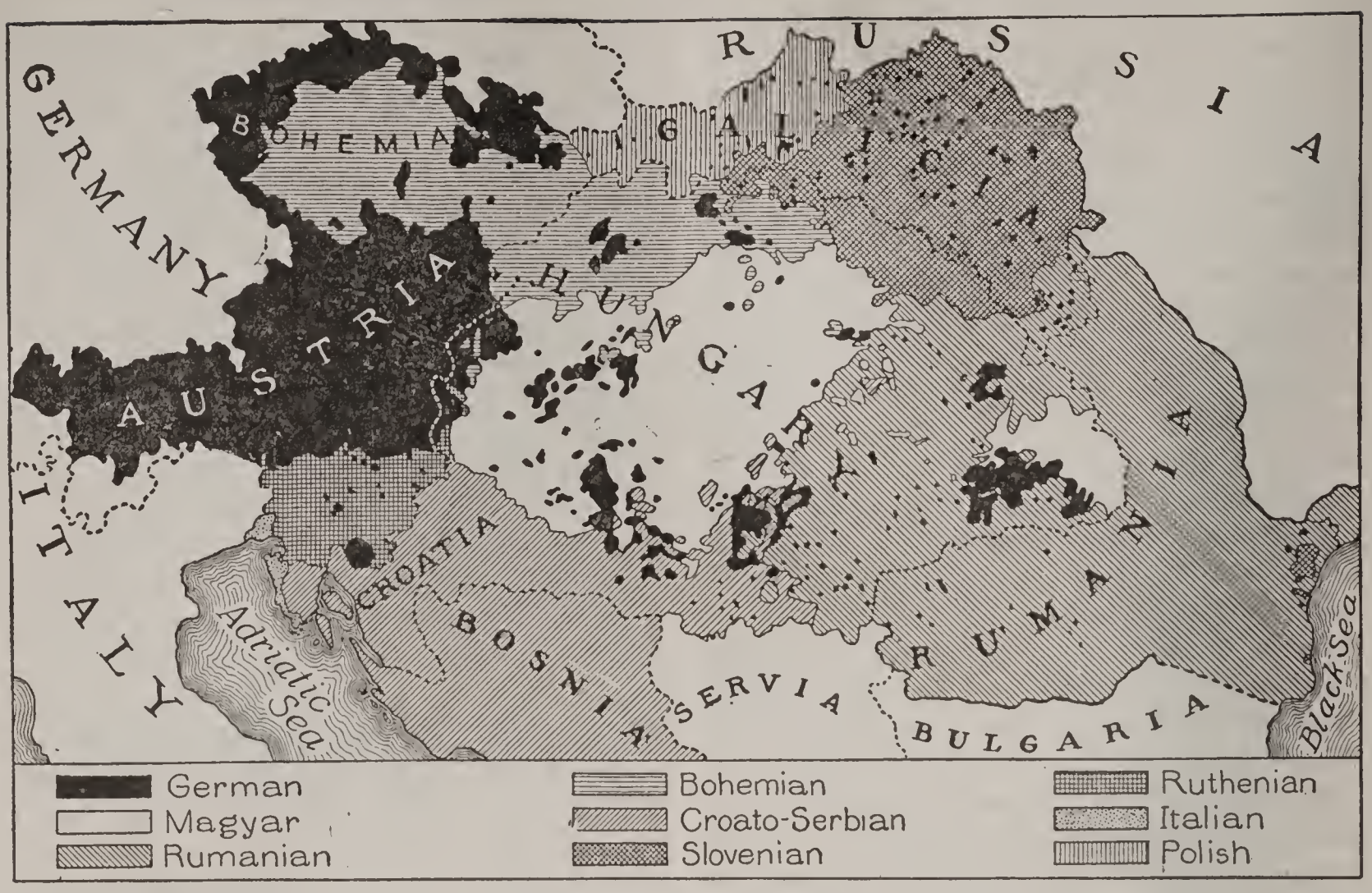
Other Natural Resources. *Forestry.* Much of the mountain country which does not lend itself to agriculture is yet extremely valuable because of its forests. Government bureaus exercised strict supervision of all forests on public lands, to prevent wasteful cutting. About 25,000,000 acres were forested in Austria, and a nearly equal amount in Hungary.

Mining. The monarchy was one of the richest of European countries in minerals, and possessed mines which were worked in the days of the Romans and still yield good returns. Coal, including lignite, is the most important mineral product; only the United States, Great Britain and Germany excel in this commodity, over 50,000,000 tons of coal and several times as much lignite being mined each year. Without this coal supply it would have been difficult for Austria-Hungary to have become the important manufacturing country into which it developed. Iron, lead and zinc, silver, quicksilver, copper, graphite, and gold are also obtained in large quantities, and the salt mines of the Carpathians have been noted for centuries. So profitable are these rock salt beds that the government held them as one of its most profitable monopolies. Precious stones of various kinds, as garnet, opal, ruby, amethyst, topaz and sapphire, add to the richness of the output.

Manufactures and Commerce. Austria-Hungary as a whole was an important manufacturing country, but the industries were by no means distributed evenly among the provinces, Austria possessing far more than did Hungary. This proved a bond of union between the two monarchies, for Austria needed Hungary's wheat, and Hungary needed Austria's manufactured products. The iron and steel and the textile industries were the most important of all, and were not only conducted on a large scale but with the most modern methods. As the monarchy raised no cotton, large imports from India and the United States were necessary, but the raw materials for the making of silk, woolen and linen goods were produced at home. Hungary manufactured much flour, while Austria produced most of the great exports of beet sugar mentioned above. For centuries the Bohemians have been famed for their skill in glass-making, and their artware is to be found in any American store which deals in such products. Porcelain of the very finest kind is also produced in Bohemia.

Ringed in by mountains and possessing less than 1,000 miles of coast line, Austria-Hungary had decided obstacles to overcome in developing a foreign commerce. That these were being more and more perfectly surmounted is shown by the steady growth in the values of imports and exports, until stopped by the War of the Nations in 1914. They nearly doubled in the ten years ending in 1913, each being then over half a billion dollars a year. Until the beginning of the twentieth century trade between Austria-Hungary and the United States was inconsiderable, but since 1900, excluding the period during the great war named, exports from the United States to Austria-Hungary increased threefold and trade in the opposite direction doubled. Austria needed chiefly cotton and machinery, while it sent to the United States beet sugar, glass, pottery and jewelry. Before the declaration of war made such commerce illegal, Canada's exports to Austria-Hungary were rapidly mounting, having increased sixfold from 1910 to 1914, while imports had remained practically stationary.

Transportation. *By Water.* Austria-Hungary was remarkably fortunate in its rivers, which afforded waterways penetrating to many parts of the monarchy. For upwards of 800



RACIAL MAP OF THE OLD DUAL MONARCHY
In few other civilized countries was there greater confusion of tongues.

miles the Danube is navigable for large vessels, and its tributaries, with the other independent river systems, furnish many hundreds of miles in addition. As water rates for shipping are considerably lower than rail rates, these rivers have played a very important part in the economic life of the country. Trieste, which was Austria's seaport, and Fiume, Hungary's outlet, rank in tonnage with such others as Boston, Baltimore, Montreal, Victoria (B. C.), Bordeaux and Copenhagen.

By Rail. But Austria-Hungary was by no means dependent on its rivers for inland transportation for there were over 29,000 miles of railway in the country. All the principal cities and towns were easy of access by rail. It was the policy of the government to buy up the railroad lines, and before the war it owned over half of the mileage of Austria and seven-eighths of that of Hungary.

Peoples and Languages. The strangest thing about this monarchy which was one country in name only was the number of peoples differing in race, language and traditions who comprised it. The United States and Canada have received by immigration representatives of many nations, some of them in large numbers, but the cases are not at all similar. The much-used phrase of the "melting-pot" expresses very truly the fact that no matter how different these American new-comers may be, they all tend within a few years or at most a generation to become citizens of their adopted country. But in Austria-Hungary that was not true. Each race is supreme in its own portion of the country. It has resisted for years the influences of the differing peoples roundabout, and clings closely to its own language and customs.

Most numerous of all the peoples are the Slavs, who made up forty-seven per cent of the whole population; but they are divided into so many branches differing from each other in language, in manners and in customs that only a student of races would recognize that they are one people (see SLAV). Bohemia, Moravia, Carniola, Galicia, Dalmatia, Croatia, Slavonia and Northern Hungary are largely Slavic, while the Germans, who comprised twenty-three per cent of the total inhabitants, made up almost the entire population of Upper and Lower Austria, and are present in smaller numbers in almost every part of the country. Because Upper and Lower Austria are German, the official language of the Austrian Empire was German.

In Hungary, however, the Magyars comprised over half of the population of the kingdom, and Magyar is therefore the official tongue (see MAGYARS). A young man in any of the

outlying provinces of Hungary, whether it be the northern Slavic portion or the Rumanian section of Transylvania, had to make himself as familiar with the Magyar language as with his own if he wished to enter political or diplomatic circles. Of Jews there were over 2,500,000—more than a sixth of all the Jews in the world; of gypsies about 95,000, and a considerable number of Armenians. (For distribution of races, see accompanying map.)

Religion and Education. There was no state Church, in the strict sense of the term, and any sect which does not preach doctrines contrary to the laws of the country was allowed freedom of worship. The Roman Catholic Church had by far the largest number of members. The Greek Church was next, and of the Protestant churches the Lutheran was strongest in the German section, and various Calvanistic creeds flourished in Hungary.

The existence of so many different races with different standards of culture made the establishment of a uniform system of education practically impossible, so throughout most of the country each province managed its own schools. This was more true in Austria than in Hungary, for in the latter monarchy the Magyars were more dominant than was any one race in Austria, and are therefore able to force their ideas to some extent on the other peoples. There was, however, in Austria as well as in Hungary a state department of instruction which exercised a supervision over provincial affairs. The German provinces of Austria had the highest educational standards, their schools being noted particularly for their fine technical training. Above the primary schools were the *gymnasia,* which prepared for the universities, and the *realschulen,* from which students went to institutes of technology. The University of Vienna, the greatest in the whole monarchy, is generally recognized as one of the foremost universities in the world; graduate students from America, especially physicians, attend it in large numbers. Hungary also had two classes of schools between the elementary and the university, and its educational system culminated in five great universities.

Illiteracy tests show that the percentage for Austria of those who cannot read and write was twenty-three and for Hungary twenty-eight; but such general statements are unfair to the more advanced portions of the country.

Emigration. The emigration from Austria has averaged in recent years, before 1914, from 250,000 to 275,000, and of these by far the larger proportions have made their homes in the United States, so the latter country had in 1910 a population of more than 2,700,000 who were born in Austria-Hungary or of Austro-Hungarian parentage. About three per cent of Canada's immigrants before the great war were from the dual monarchy. As with so many of the European nations, the compulsory military service has been held to account for much of the emigration. See ARMY, subhead *Austria-Hungary.*

Government and Cities. Under the subhead *Government* in the articles AUSTRIA and HUNGARY are treated the separate governments of the dual monarchy, but there are certain functions which they had in common. Thus questions of national finance, war and foreign relations were dealt with by two Delegations, one chosen by the Austrian Parliament, one by the Hungarian, and each consisting of sixty members. These met one year at Vienna and the next at Budapest, and held their sessions separately. The results of the deliberations were sent from one to the other in writing, and if after three such interchanges they failed to agree, they met for voting, but not for discussion.

KARL FRANZ JOSEPH
Succeeded Francis Joseph on November 21, 1916. Abdicated, November 12, 1918. Died, 1922.

The chief cities in the old Austria were Vienna, the capital; Trieste, Prague, Lemberg, Cracow and Gratz; in Hungary, Budapest and Szegedin. All the more important cities are described at length in their alphabetical order in these volumes.

History. The history of the two monarchies up to 1867 is treated separately in the articles AUSTRIA and HUNGARY. That was the year of the *Ausgleich,* or agreement, by which the two sovereign states were made one monarchy with a single ruler and a single flag. The position of the two countries at that time explains the peculiar arrangement: Hungary, ever eager for independence, was almost but not quite strong enough to demand it; Austria, its weakness made plain by the rapidity

AUSTRO-HUNGARIAN EMPIRE AS IT EXISTED TO 1918

From the Congress of Vienna (1815) to the Cession of Lombardy (1859) and of Venetia (1866).

1. Kingdom of Wurtemburg
2. Kingdom of Bavaria
3. Kingdom of Saxony
4. Bohemia
5. Prussia
6. Austria
7. Lombardy
8. Venetia
9. Croatia
10. Slavonia
11. Hungary
12. Galicia, or Austrian Poland
13. Transylvania

of Prussia's victory in 1866, felt obliged to make concessions; and with one demanding all that it dared, the other conceding only what it must, a carefully-balanced plan was worked out to give neither the upper hand. At the same time the interests of the other races, an actual majority in the empire, were ignored. Naturally, since such feelings lay back of it, the arrangement was never quite satisfactory to either side. The high-spirited Magyars, the Czechs of Bohemia, and the Slavs of both North and South displayed increasing desire for independence. The parliaments of both Austria and Hungary were probably the most turbulent in the world, and the struggles of the members were not always confined to words.

Foreign Affairs. Exclusion from Germany turned Austria's attention in another direction, and after 1866 the Balkan question was Austria's chief problem. At this time Turkey still bordered Austria on the Adriatic, and Serbia, Bulgaria and Rumania were vassals of the Sultan. Austria wished to assume the rôle of protector of the Balkan Slav peoples against Turkish oppression, but Russia, a nation of Slavs, had the same desire. Austria's dream was to extend its empire southward to the Mediterranean, since the establishment of the kingdom of Italy had made its ports on the north of the Adriatic of little value in war time. Russia's aim had long been the same. This rivalry, after nearly setting Europe on fire several times, became one of the chief causes of the War of the Nations.

When Russia freed the Balkan nations and added to its own territory in its war of 1877, the other powers granted Austria the administration of Bosnia and Herzegovina, which were still, however, considered Turkish provinces. In 1908, after the Turkish revolution, Austria annexed them. This angered Serbia and Montenegro, who threatened war. At the close of the Balkan War of 1912-13 Austria led the other powers in preventing Serbia from obtaining Saloniki or a port on the Adriatic, and in setting up the independent state of Albania out of territory conquered by Montenegro, Serbia and Greece. See ALBANIA.

On June 28, 1914, the Archduke Francis Ferdinand, the emperor's nephew and heir to his throne, was assassinated at Serajevo, the capital of Bosnia, by a Serbian student. Austria declared the plot a part of the agitation

to unite all the Slavs under Serbian rule, asserted that it was backed by the Serbian government, and demanded that Serbia officially condemn the Pan-Slav agitation, suppress anti-Austrian books, newspapers and societies, and permit Austria to handle the investigation of the outrage and determine what Serbian officers and officials should be discharged. Serbia accepted most of these conditions short of actual Austrian interference in its affairs, but Austria was not satisfied. Russia's determination to prevent the loss of Serbia's independence involved the rest of Europe, and Austria-Hungary's declaration of war against Serbia on July 28 was but the first of the long list which made the War of the Nations. The main course of events after this date will be found in the article elsewhere on the war.

The War. The first declaration of war was succeeded by the following:

1914	
Austria-Hungary on Russia,	August 6
Montenegro on Austria-Hungary,	August 7
France on Austria-Hungary,	August 10
Great Britain on Austria-Hungary,	August 12
Austria-Hungary on Japan,	August 27
Austria-Hungary on Belgium,	August 28
1915	
Italy on Austria-Hungary,	May 23
1916	
Austria-Hungary on Portugal,	March 15
Rumania on Austria-Hungary,	August 27
1917	
United States on Austria-Hungary,	December 7

During the war all of Austria's old problems—of its relations with Germany, of its rivalry with Italy, of its control of its own people—were revived or intensified. To understand these questions the reader should know the earlier history, told in the article AUSTRIA.

The reopening of the German question came through Prussian successes and Austro-Hungarian failures in the early part of the war. Prussian-trained generals and officers were obviously superior, and were given commands in the Austro-Hungarian army. Austria was the weaker and soon became the subordinate member of the alliance. The struggle against the surrounding nations seemed to foster a German determination to become independent of the rest of the world, and one of the schemes proposed for after the war was a Customs Union which should include Austria-Hungary. Austrians opposed this because the better organization of German industries would give the latter an advantage; Hungarians opposed it for a similar reason and because, as an agricultural people, they were already discontented with the tariff union with Austria. There was fear, too, that Germany hoped for political domination in the new union. The final result showed how useless was their scheming.

The Italian people had never been satisfied with the territory acquired from Austria by the Seven Weeks' War. They looked upon the large numbers of Italian-speaking people in the Tyrol, east of Venice and in Dalmatia as their brothers, and they called these lands *Italia irredenta,* unredeemed Italy. For strategic reasons, too, Italy wished the eastern shore of the Adriatic. Nevertheless, at the outbreak of the war Italy was Austria-Hungary's ally. In 1879 Austria-Hungary and Germany had formed a protective alliance against Russia and France; Italy had joined them in 1882, after the French occupation of Tunis, thus forming the famous Triple Alliance. One of the provisions of the treaty was that if either Austria-Hungary or Italy should occupy territory in the Balkans, the other should be compensated. On the basis of this Italy, while still neutral, demanded territory in return for Austria-Hungary's occupation of Serbia, and insisted that the territory ceded should be a part of *Italia irredenta,* the Trent and Trieste. Germany pressed Austria to concede, but the Italian demand that the territory should be immediately delivered was refused, and Italy declared war.

Most of the subjects of Austria-Hungary fought loyally in the war. From time to time there were rumors of the shooting of Czech and Slav soldiers for mutiny, and of riots among the people when food became scarce in the cities, but the country was so cut off from the rest of the world that the truth could not be known. Complaints were made in the Hungarian Parliament, based on the casualty lists, that the Hungarian soldiers were being sacrificed and the Austrian soldiers saved.

During the war differences arose between the United States and Austria-Hungary regarding the former's shipment of munitions to other powers and the latter's attacks on the *Ancona* and the *Petrolite.* The United States also requested and secured the withdrawal of Ambassador Dumba for complicity in plots to interfere with munition making.

For later events, see the early paragraphs in this article, also story of the WAR OF THE NATIONS.

Other Items of Interest. The only useful mineral which Austria did not have is platinum.

Saint Ulrich, in the Tyrol, has been for two centuries known for its wood-carving. One of its specialties has been the little Noah's Ark animals, and the industry has become so finely subdivided that frequently one family makes only cows, another only lions, and so on.

The dual monarchy ranked high among the nations of Europe in respect to the number of great musicians it has produced. On its roll appear the names of Czerny, Dvorak, Hadyn, Liszt, Kubelik and Joachim.

The tobacco of Hungary constituted a strict government monopoly.

Of the 275,000 gypsies which lived in Hungary, less than 10,000 are of the old roving type, the remainder having adopted in some degree settled occupations.

The northern end of the beautiful Lake Garda is in the Tyrol. The fertility of the surrounding country gave it its old name of Garden Lake.

In many of the crownlands of Austria voting for member of the *Reichsrath* was compulsory. Every voter was obliged to appear at the polls or pay a fine.

Marie Antoinette, the unfortunate queen who played so large a part in French history, was the daughter of Maria Theresa of Austria. E.Z.

Consult Colquhoun's *The Whirlpool of Europe, Austria-Hungary and the Hapsburgs;* Rumbold's *Franz Joseph and His Own Time.*

Related Subjects. The reader who is interested in the former dual monarchy will find much detailed, systematic information in the following articles. Among the references also will be found the new states formed out of the old monarchy:

CITIES AND TOWNS

Baden	Klausenburg
Brünn	Lemberg
Budapest	Pilsen
Carlsbad	Prague
Cracow	Pressburg
Czernowitz	Szegedin
Gratz	Trieste
Innsbrück	Vienna

MOUNTAINS

Alps	Carpathian

IMPORTANT PRODUCTS

Cattle	Gold
Coal	Lumber
Copper	Pottery
Corn	Salt
Glass	Silver
Sugar Beets	Wheat
Tobacco	Wine

RIVERS

Danube	Elbe
Dniester	Save
Drave	Vistula

STATES

Austria	Dalmatia
Bohemia	Galicia
Bosnia	Hungary
Bukowina	Jugo-Slavia
Czecho-Slovak Republic	Moravia
Croatia and Slavonia	Tyrol

HISTORY

Austerlitz	Succession Wars
Hapsburg	Thirty Years' War
Holy Roman Empire	Utrecht, Peace of
Sadowa, Battle of	Vienna, Congress of
Seven Weeks' War	War of the Nations

AUSTRIAN SUCCESSION, *aws' tri an suk ses' shun,* WAR OF THE. See SUCCESSION WARS, subhead *War of the Austrian Succession.*

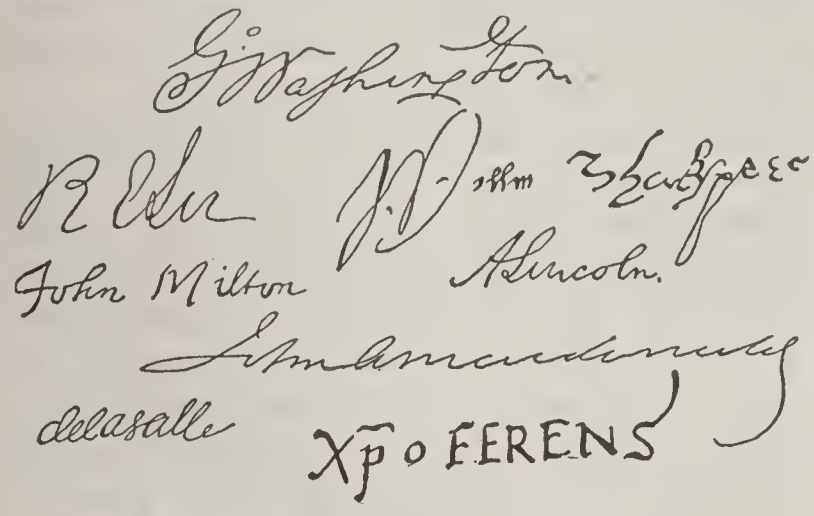
AUTOCRAT OF THE BREAKFAST TABLE, the title of a book held by some to be the most popular and interesting work of Oliver Wendell Holmes. In it his wit and humor, his kindly philosophy and delightful style are combined with the ease and charm of conversation which always distinguished him; for the *Autocrat* is simply the conversation at the breakfast table of a Boston boarding house. Holmes himself, the Autocrat, does most of the talking, but the Schoolmistress, the Young Man Called John, the Old Gentleman Opposite and several others are very clearly characterized. The book comprises a collection of sketches which first appeared in the *Atlantic Monthly,* in 1857 and 1858; up to that time Holmes had only a local reputation save as the author of the poem *Old Ironsides,* but with the publication of these he at once became a man of literary note.

AUTOGRAPH, *aw' to graf,* an original manuscript or signature, in the handwriting of the one who composed it. The word means, literally, *writing in one's own hand,* from *autos,* the Greek word for *self,* and *graphein,* meaning *to write.* In all ages the handwriting of famous men and women has been of interest. In the most ancient times of which we have record, manuscripts were frequently preserved, sometimes because of their historical importance, but also because they were in the handwriting of noted people. One of the Ptolemies of Egypt is said to have exchanged wheat for the privilege of copying the manuscripts left by Aeschylus, Sophocles and Euripides, and the elder Pliny speaks of seeing a collection of

autographs of famous men who lived two centuries before him.

The interest and value of autographs depend on the fame of the writer, on the relative scarcity of specimens, and also on the historical or other interest of the particular example. A letter in which Christopher Columbus announced the discovery of the New World would be priceless; all of the twenty-nine authentic Columbus autographs are in the hands of his descendants and will probably never be sold. A letter written by Americus Vespucius to his father is one of the priceless gems in the British Museum, which probably has the greatest autograph collection in the world. Six hours before her death, Mary Queen of Scots wrote to King Henry III of France, asking him to take care of her son "as much as he deserves it"; this letter is also in the British Museum. Among other famous people whose autographs are very rare are Leonardo da Vinci, Raphael, Sir Francis Drake, Sir Thomas More and John Milton.

The value of an autograph depends greatly on the character of the example. A signature of George Washington is worth perhaps $20 to $40, whereas an entire letter in his handwriting has sold for as much as $500 or $600. A letter



SOME NOTABLE AUTOGRAPHS

Reading in order from top to bottom and from left to right, the names are G. Washington, R. E. Lee, William Shakespeare, John Milton, A. Lincoln, John A. Macdonald, De la Salle, Christopher Columbus.

to his father, in which General Grant announced his enlistment in the Union army, was recently sold for $910, but letters of his of no particular interest may be bought for $10 to $40. In December, 1860, Abraham Lincoln wrote to his friend, Lyman Trumbull, about the possibility of compromise between the North and South; this letter was sold in 1914 at public auction for $1,100. At the same time a letter from Lincoln to Grant, written on April 6, 1865, only three days before he was shot, was sold for $1,375. Autograph letters by Keats, Shelley, Charlotte Corday, La Salle, Marquette, Frontenac, John Eliot, Peter Minuit and Nathan Hale are highly prized.

For the Young Collector. The beginner cannot hope to acquire such almost priceless autographs, but he can start with those which are within the limits of his purse. Many living men of prominence are glad to grant requests for autographs. The beginner must not be discouraged, however, if his is one of the hundreds of requests which are refused. There is the story of one little girl who wrote to a great man for his autograph: in reply he said that he never granted such requests, and the unthinking girl tore up his letter! The seeker for autographs should be careful to spell names and addresses correctly, not like one careless or ignorant collector who wrote to Robert Louis Stevenson but spelled his name Stephenson. There are few celebrities who would take the trouble to answer such a request, even with the gentle sarcasm which Stevenson turned on this correspondent. The autograph collector should always remember that he is asking a favor of a man or woman who probably receives a dozen similar requests a day, and the least the collector can do is to be as courteous and considerate and brief as possible. W.F.Z.

AUTO-INTOXICATION, the name applied to a chronic form of "self-poisoning," due to absorption of toxins produced in the body by physical disorders. A very common cause is incomplete digestion in the intestinal tract, as a result of which there is an accumulation of the poisonous by-products of the digestive process. Among the evidences of this form of self-poisoning are constipation, anaemia, headache and so-called "bilious" attacks. Hygienic living and special attention to the diet are helpful measures for the cure of this condition.

AUTOMATON, a device which represents the figures and actions of animals and human beings. Some very ingenious pieces of mechanism of this character have been made, such as singing and flying birds, and mechanical figures capable of playing instruments, writing, etc. In 1875 there was exhibited in England a seated human figure, "Psycho," that created widespread interest. It could move its head, select from a rack in front of it the cards needed in playing a hand of whist, and work out numerous mathematical calculations. The inventor of this automaton devised another figure which could draw the likeness of any person selected from a list of 200 names.

AUTOMOBILE, *aw to mo' beel,* which means literally *self-movable,* is the name popularly given to all forms of self-propelled vehicles, except traction engines and railway locomotives, which are built for carrying passengers and goods and fitted to run on streets and roads without a track. Though Sir Isaac Newton in 1680 invented a toy horseless carriage, it was more than two centuries later before the automobile became of practical use. It was not until after 1890 that the experiments of many inventors began to bear fruit, and a few pioneers began to buy the new style of vehicle. But the automobile was still regarded as an expensive plaything, interesting enough but of no practical use. England, for example, thought so little of the value of the new machine and considered it such a dangerous agent that a law, enforced until 1896, forbade automobiles to speed at more than four miles an hour and required that a man waving a red flag should precede every power-driven vehicle! Other countries placed no such burdens on automobiles, but gave them little encouragement.

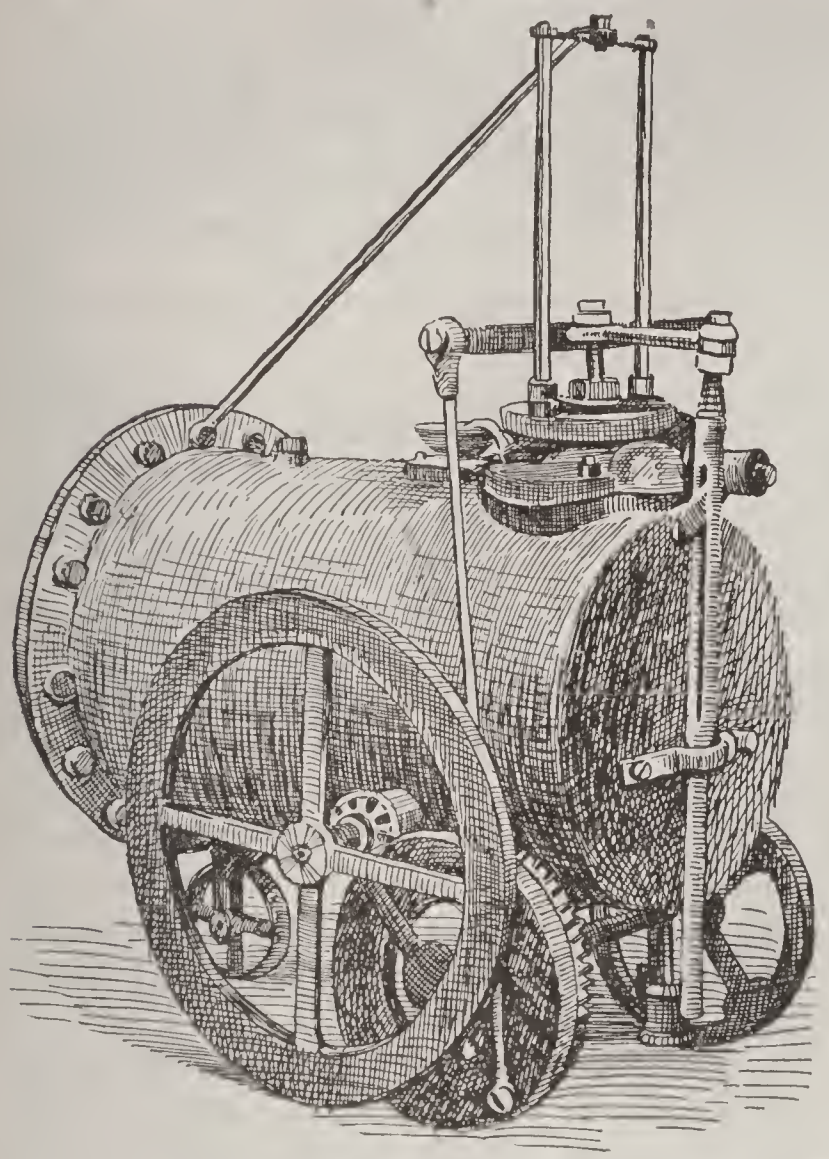
The first automobile race was held in 1894 from Paris to Rouen, a distance of about eighty miles. The first race in America was held on November 2, 1895, at Chicago, over a course of ninety miles. Two cars started, but only one car finished, covering the ninety-mile course after eight hours forty-eight minutes of clattering and puffing. During the race this automobile consumed five and one-half gallons of gasoline, stopped ten times for repairs, and made an average speed of nearly ten miles an hour. The automobile was stopped several times to take on supplies of gasoline and cakes of ice, the ice being placed in a receptacle attached to the motor to cool the engine.

These details seem laughable in this day of swiftly-moving, high-powered and efficient machines, but in 1895 they aroused a general public interest which laid the foundation for the present great industry. In 1890 there was no automobile industry; according to the census for 1900, there were in the United States alone fifty manufacturers who made about 4,000 cars valued at $5,000,000. In 1910 seven times the number of manufacturers were making over thirty times the number, valued at over fifty times $5,000,000. In 1920 there were 315 factories making automobiles, and scores of others making parts of cars. From 125,000 in 1909 the production jumped to 175,000 in 1910, to 378,000 in 1912, 515,000 in 1914, 900,000 in 1915, and 1,553 349 in 1920. The retail value of these automobiles was over $2,400,000,000. At the beginning of 1916 there were over 2,000,000 automobiles in the United States alone; the production for 1922 brought the number in use in the United States and Canada to over 10,000,000. Great Britain and Ireland have about 250,000 automobiles of all kinds; France, 90,000; Germany, 70,000, Austria and Hungary, 20,000, and Russia, not more than 7,500.

In the course of a single year the United States alone uses considerably more than 1,500,000,000 gallons of gasoline for driving automobiles. If this quantity were placed in five-gallon cans, and the cans placed side by side, a double line of cans would encircle the earth at the equator. It is also estimated that about 30,000,000 gallons of lubricating oil and 16,000,000 rubber tires are used each year.

The enormous increase in the number of automobiles has been due to the great reduction in prices. In 1899, when automobiles were still novelties, the average price of a runabout was $1,300; a touring car seldom sold for less than $2,500. In 1907 the average price was $2,100; after the war prices greatly advanced, but by 1923 had been beaten back nearly to pre-war prices in many notable instances. Prices ranged from $365 to $16,000. Once the automobile was a luxury reserved for the rich; now it is a convenience and in many cases almost a business necessity for persons in moderate circumstances. At the same time American manufacturers have learned how to create the most expensive automobiles, to

suit the most fastidious tastes. Only a few years ago it was the fashion, among those who could afford it, to buy only French, German or English-made automobiles. To-day the United



THE IDEA EXISTED IN 1797
Trevithick's road locomotive, the first self-propelled vehicle ever constructed.

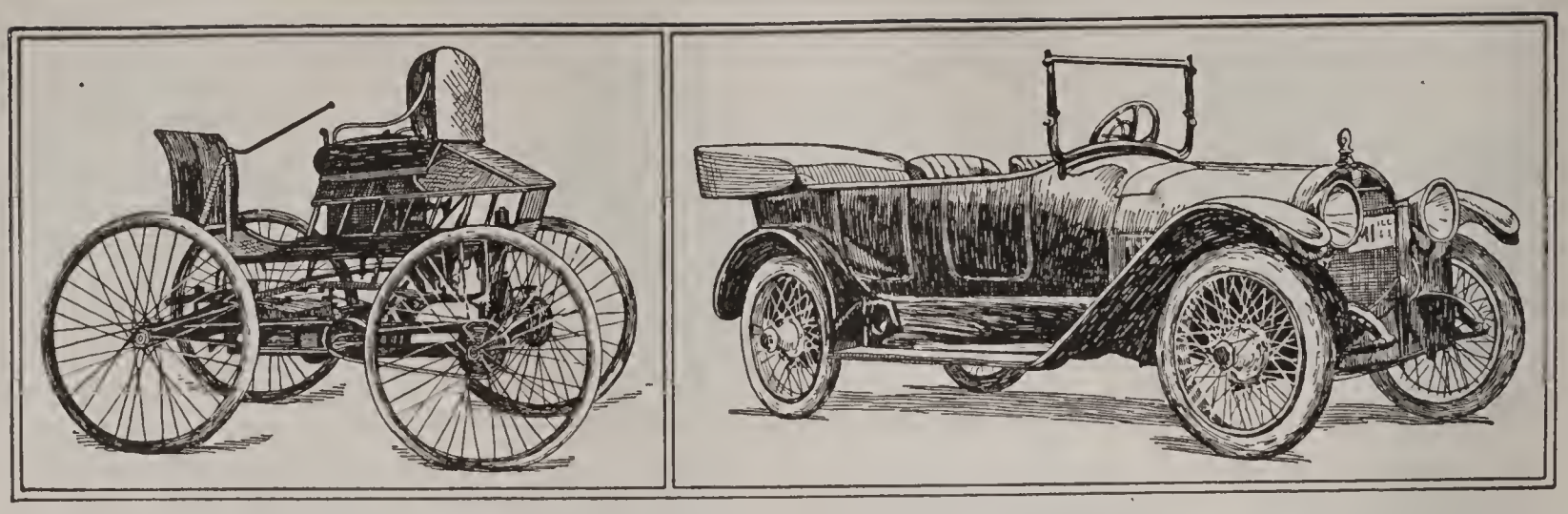
States is not only making automobiles equal to those in any other country, but is actually exporting over $30,000,000 worth of automobiles a year.

The Chassis and Body. An automobile consists of two main parts, the *chassis* and the *body*. *Chassis* is a French word, pronounced *sha' see,* and originally meant the mounting or stationary part of a cannon in a fortress. It is the foundation for all the parts which are movable and are used to raise or turn the gun. In an automobile the chassis comprises the frame, wheels, springs, motor, and the mechanism by which power is transmitted from the motor to the wheels—in fact everything essential to the operation of the machine. Sometimes the engine and transmission are not included in the term. All the rest of the structure, which merely provides accommodation for passengers or goods, is called the *body*. The body and chassis are entirely distinct, and it is possible to transfer a single body from one chassis to another, and also to use several bodies at different times on the same chassis. The process may be compared to a man changing his clothes. Not every automobile body, of course, will fit any chassis, any more than every suit will fit any man. Manufacturers usually standardize the chassis, and make the body in a variety of styles to suit the individual tastes and needs of buyers.

Styles and Uses of Automobiles. The word automobile was created to meet a sudden demand for some term which would describe a "horseless carriage." There has been, recently, a tendency to substitute other terms, such as *motor car,* either *motor* or *car* alone, and *motor vehicle.* The British, in fact, have never used the word *automobile,* but have adopted the term *motor car.* The use of automobiles for business purposes has also led to the use of the term *motor truck* for the larger and heavier vehicles. As the word *automobile,* moreover, is really a French adjective, there is good reason for substituting a noun such as *car, truck,* or *vehicle.*

The variety of purposes for which automobiles are now used has led to the creation of three distinct types of cars, each of which is described in detail below.

1. *Pleasure Vehicles.* All the earliest automobiles were pleasure vehicles solely. They resembled closely the single-seated buggy or runabout, and the power was provided by a noisy one-cylinder engine. The next step was a two-seated conveyance, seating four persons, and resembling the surrey. From this two-seated style, the present standard *touring car* has been developed. The speed of automobiles risked the safety of passengers on the open rear seat, and made necessary better protection from wind, rain, mud and dust. For these reasons the rear of the car was soon given a rounded shape, much like that of a cup or bowl. The French, seeing a resemblance to a barrel, called this part the *tonneau,* meaning literally *hogshead.* The name remains, but the exaggerated, bulging curves have long since disappeared. Later, as sheet steel and aluminum bodies were gradually substituted for wood, the designers began to construct more artistic models, following what are known as *stream lines.* This expression is borrowed from shipbuilders; it means that the general effect is one of length; the form tapers towards the front, or hood, to lessen air resistance. The length of automobiles has been gradually increased, while the width and the height from the ground have been decreased.



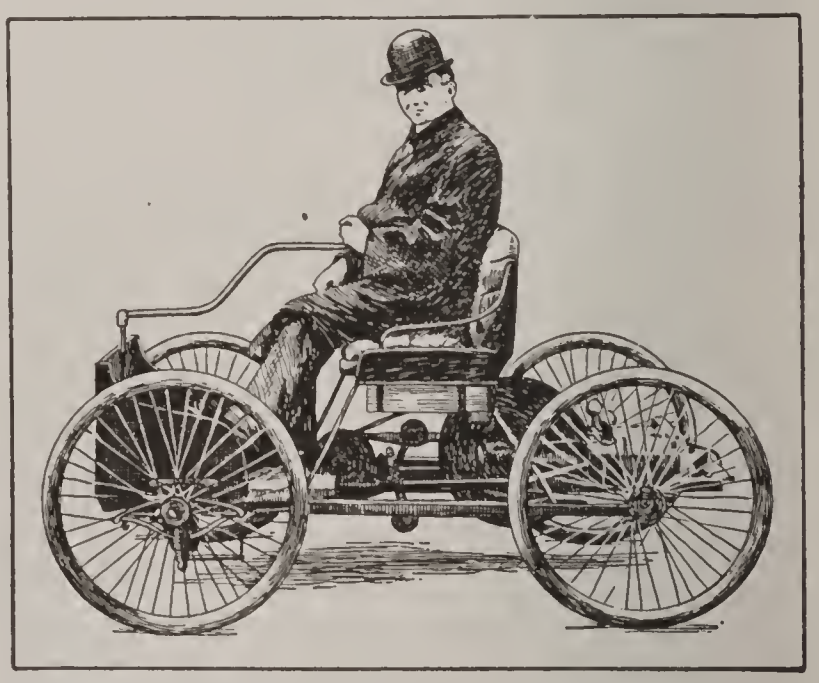
SHARP CONTRASTS IN DEVELOPMENT

The car at the left was made by Elwood Haynes in 1894; in the next year it won a prize for excellence in design. The car at the right is a modern model from the factory of the same company, showing the development of twenty years.

A modern *touring car* usually seats five or seven passengers—the driver and one other person in front, three persons in the rear, and two on separate seats in the tonneau. These latter seats may be fixed in place, or made to fold out of the way when not in use. Touring cars are usually provided with collapsible cloth tops and sides, which can be lowered and folded at the back of the tonneau. When the top and sides are permanent, are made of wood or metal, and provided with glass in the doors and windows, the car is known as a *limousine*. The open touring car is the proper vehicle for use in the open country, because of its lighter weight, but for city use the limousine is sometimes more desirable, as it gives better protection from stormy weather. A limousine body is much heavier and somewhat more costly than a touring car. Another standard type is the *roadster,* which at first was a touring car built for two passengers, but by 1916 new model roadsters provided seats for one or two additional passengers in rather cramped quarters. The roadster is light, powerful, speedy, and particularly serviceable for the owner who is also driver. There is, in addition, a variety of more or less standardized models for special purposes, including such familiar types as taxicabs, motor omnibuses and sight-seeing motors.

2. *Automobiles for Racing.* From the roadster has been developed a type of automobile specially built for speed. A car built for racing seats only two persons, the driver and his assistant, or *mechanician.* The body of the car is constructed to offer the least possible resistance to air; it stands close to the ground, is narrow for its length and often sharp-pointed at the front, and carries nothing which will add superfluous weight. Automobile race meets have been a regular feature since the automobile first came into general use. The two most important events in former years were the annual races for the Vanderbilt Cup in New York and for the Grand Prize of the Automobile Clubs, the former usually at 300 miles and the latter at 400 miles. Later Indianapolis built what was at the time the greatest speedway in the world, on which 500-mile races were run regularly every year on Memorial Day. Chicago followed with a similar speedway in 1915, and other cities by the dozen emulated these two examples, though on a less pretentious scale.

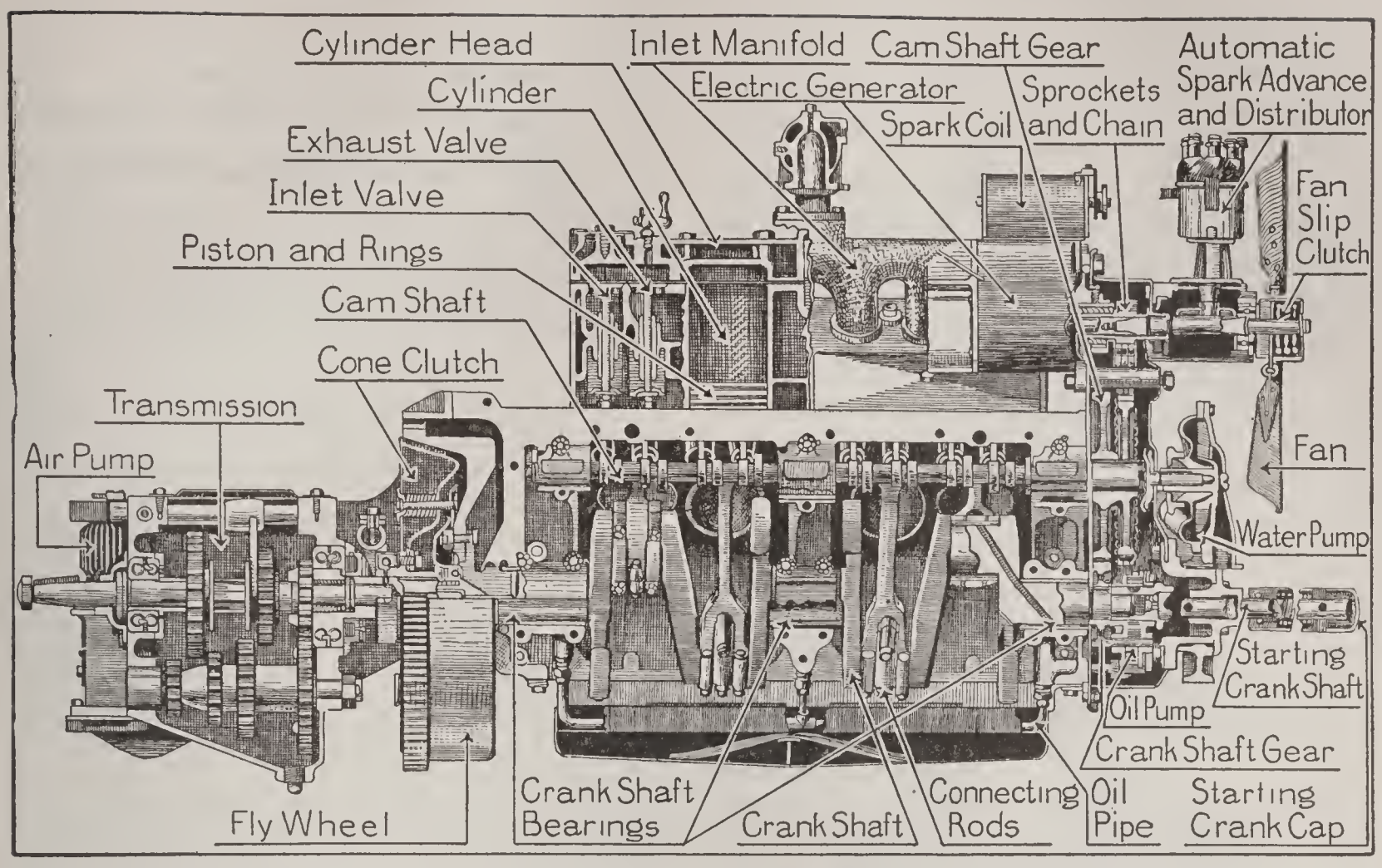
The speed record for a mile is 25.40 seconds, or about 140 miles an hour. For 100 miles the record is fifty-six minutes 55.71 seconds, made in 1915 at New York; this speed is at the rate of 105.39 miles per hour. Various records both for longer and shorter distances



THE FIRST FORD

The 1896 model of the Ford automobile, Henry Ford, the inventor, at the steering lever.

have been made, with average speeds ranging from seventy to 100 miles an hour. The highest average for a distance over 100 miles was also made at New York in 1915, when the winner of a 350-mile race finished in three



LONGITUDINAL SECTION THROUGH MOTOR AND TRANSMISSION

hours twenty-four minutes forty-two seconds, an average of 102.60 miles per hour. This is faster than any railroad train has ever traveled for the same length of time. The fastest time ever made by a railroad train was in Florida in 1901 at the rate of 120 miles an hour for five miles, but the highest average for a distance of more than ten miles is only 98.7 miles an hour, and for 100 miles the record is an average of only 84.6 miles per hour. The highest speed ever maintained by an aeroplane is 126.69 miles an hour.

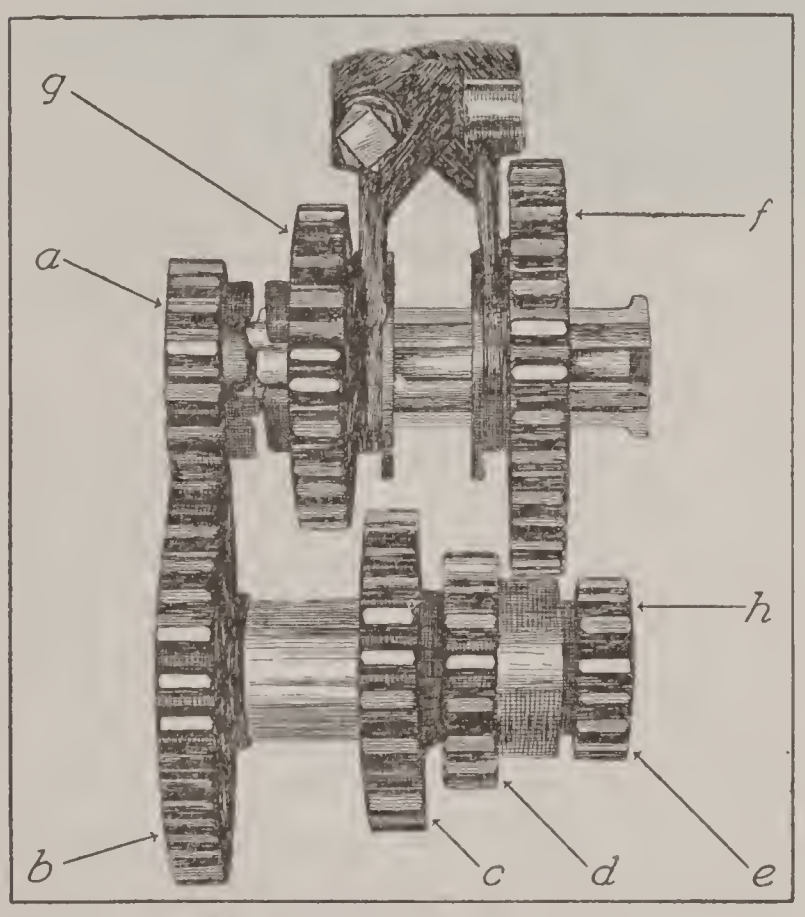
3. *Trucks and other Commercial Vehicles.* This class includes all styles from the small delivery wagons of the retail stores to great trucks for carrying coal, stone and other heavy materials. The special features of these vehicles are their greater capacity, as compared with horse-drawn wagons, and the greater distance they can cover. The earliest cars were bodies of horse-drawn wagons placed on a motor chassis, but now special designs are in use for every possible purpose. Automobiles are being used for business purposes to an ever-increasing extent; the initial investment is somewhat greater than the cost of a horse and wagon, but the maintenance charge is less, and the amount of work done is much greater. A team and wagon can cover an average distance of sixteen to twenty miles a day; a small delivery automobile can cover this distance in an hour, and even a heavy truck can cover seventy to 100 miles a day. Under the same conditions the cost of delivering a package by automobile is less than one-half the cost of delivery by horse and wagon. In the large cities the automobile is rapidly supplanting the horse for all business purposes.

The Mechanism of an Automobile. The propelling power of an automobile is derived either from steam, gasoline or electricity. Other methods have been tried, but these three are the only ones which have ever been in practical use.

Steam-Driven Vehicles. This was the first type of automobile to be developed. In this type the fuel, usually gasoline, is burned under a water-filled boiler. The steam generated then drives a steam engine almost exactly the same as that of a railway locomotive. At first the "steamers," as they were called, were the most popular variety. They ran quietly; because they had no noisy gears or transmission; their speed could be varied merely by shifting a throttle; and there was always a reserve of power in the boiler which made it easy to start the machine. As the gasoline automobiles, however, were gradually improved, the disadvantage of the steamers began to weigh against them, and in a few years their popularity was largely gone. In 1916 only one important steam car was manufactured. The chief objections to them were the danger of fire from the flame, the firebox being

open, the possibility of freezing the water in the boiler in cold weather, and in all cases the length of time required to generate steam when the engine was cold.

Gasoline or Internal-Combustion Engines. All of the pioneers who tried to construct a self-propelled vehicle, from the days of Sir Isaac Newton almost to the end of the nineteenth century, used steam as a motive power. In 1872 George B. Selden of Rochester, N. Y., applied to the United States for a patent to cover a new idea, the application of an internal-combustion engine to a self-propelled vehicle. The patent was not granted until 1895, and by that time there were other inventors using



HOW GEARS ARE SHIFTED

As the car gains speed and less power is required to drive it, the gear lever is shifted from low, or first speed, to the second, or intermediate speed position. Then gear *f* is moved out of mesh with gear *d* to the position shown in the illustration, while gear *g* is moved into mesh with gear *c*. The power is then transmitted, on high, or third speed, through gears *a*, *b*, *c*, and *g*.

the same idea. Among them were Charles B. Duryea, sometimes called the father of the American automobile, Elwood Haynes, Alexander Winton, Frank B. Stearns, R. E. Olds and Henry Ford. Ford began to build his first machine in 1894, and finished it two years later; now his factory turns out finished cars at the rate of more than 1,500 a day.

In the automobiles built by these and other men the propelling force is derived from an internal-combustion engine (which see). Various fuels have been tried at one time or another, but gasoline is the only one now in general use (see GASOLINE). Though the increasing cost of gasoline has led to the manufacture of possible substitutes, none of these has yet taken its place. In a gasoline engine the liquid gasoline is forced through a carburetor (which see), which turns it into a fine spray and mixes it with air. This mixture

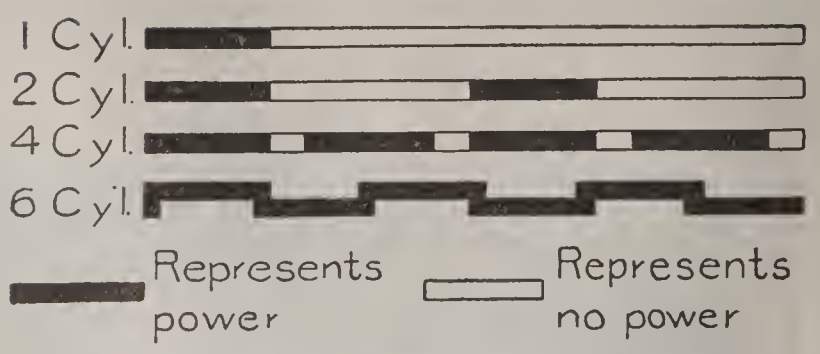


DIAGRAM SHOWING LOSS OF POWER

A great many people find it puzzling to understand why continuous power can only be obtained from an engine of six cylinders or more. If the following simple explanation be followed carefully the reason will become evident, for, stripped of its technicalities, the subject is comparatively simple.

It should be remembered that the only part of an automobile which produces power is the engine—not the fly-wheel, carburetor or magneto. It is true that the first stores up energy, but it can produce none. Let the operations of a single cylinder engine be considered first, for multiple cylinder engines consist simply of a number of separate and similar cylinders, the power from which is applied in sequence and at different angles to the crank shaft.

In the single cylinder engine, four strokes of the piston (two strokes toward the crank shaft and two strokes in the opposite direction) are required to complete each "cycle." A cycle is simply one complete series of operations. Each cycle requires two complete revolutions of the crank shaft.

The four strokes found in the single cylinder engine are:

First. First half revolution of the crank shaft; piston travels toward the crank shaft; gas is drawn into the cylinder. This is the suction stroke.

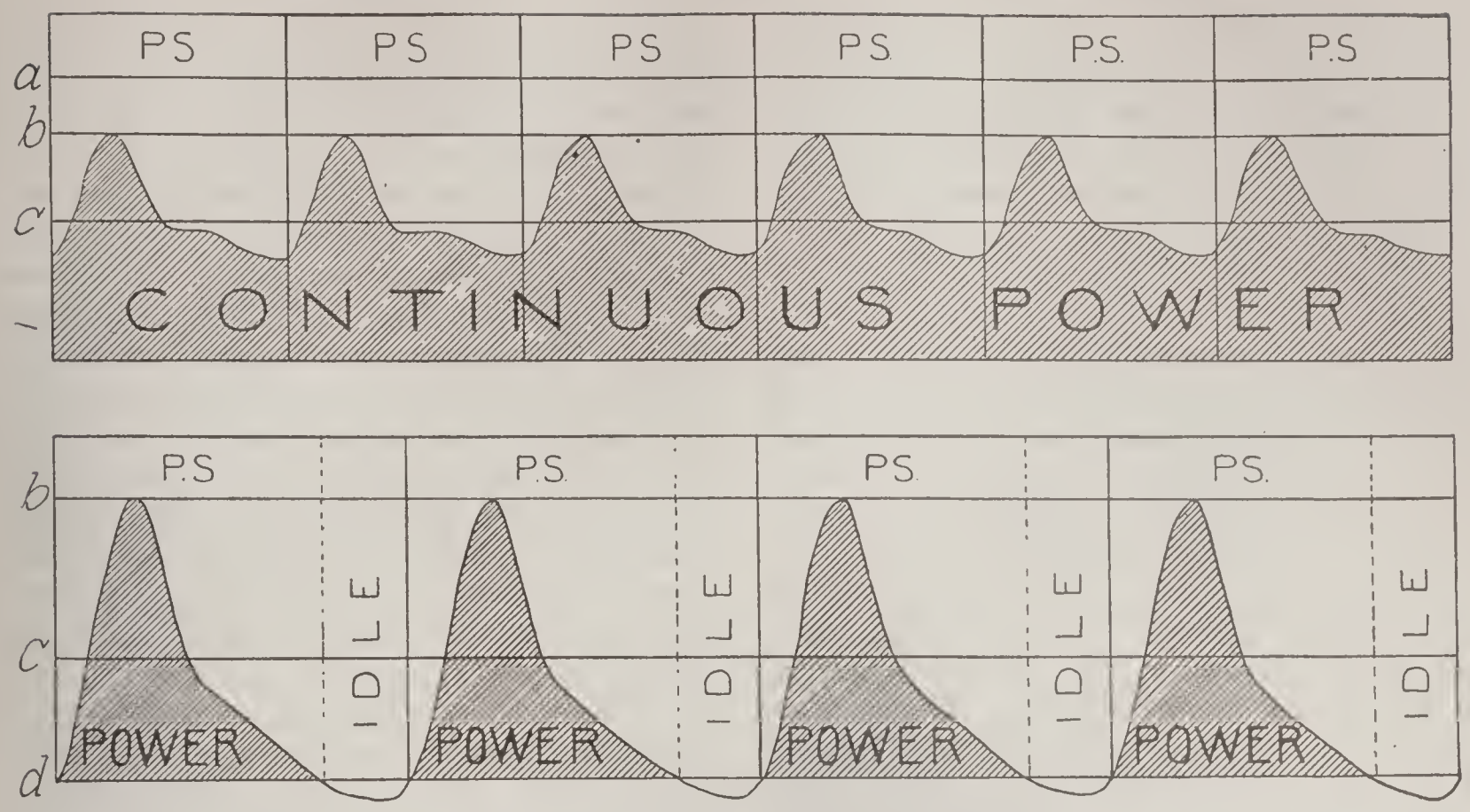
Second. Second half revolution of the crank shaft; piston travels back; gas is compressed in the cylinder. This is the compression stroke.

Third. Third half revolution of the crank shaft; piston travels toward the crank shaft; combustion and expansion of gas in the cylinder; this is the power stroke.

Fourth. Fourth half revolution of the crank shaft; piston travels back; burned gas is expelled from the cylinder. This is the exhaust stroke.

These four strokes are continuously repeated in rotation as long as the motor runs. However, there is one important point to be remembered; namely, power is *not* produced in any cylinder throughout all of the power stroke, but, approximately, through only four-fifths of it. It is evident then, even to the casual observer, that it is utterly impossible for the single or two-cylinder engine to deliver continuous power, as each cylinder delivers power through less than one-fourth of the cycle. Many think, however, that the four-cylinder will give continuous power, and it would if it were not for this fact, that in not quite all this so-called power stroke is power available. As a consequence, to obtain continuous power the six-cylinder engine has been developed. Engines of eight and twelve cylinders are also sold, but they do not develop continuous power more effectively than the six-cylinder. However, they add to the horse power of the engine.

All this is much more easily grasped by inspection of the second diagram. It will thus be seen why that small fraction of the power stroke which is not available for power shuts out the four-cycle engine from being an absolutely continuous power producer.



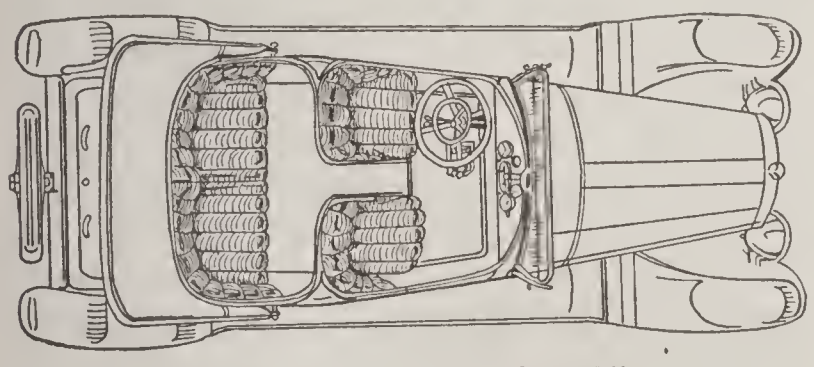
GRAPHIC COMPARISON OF POWER

The above illustration graphically indicates the power produced by a six-cylinder and a four-cylinder engine, and gives fuller explanation of the illustration above. It shows that the greatest pressure of a four is greater than that of the six; but the "six" produces continuous and more nearly constant power, whereas in the "four" high pressure is followed by a moment of no pressure at all. Shaded portion shows graphically the total pressure applied in a single cycle. Both diagrams on same scale.

Six-Cylinder (above): (*a*) highest pressure in a four whose power is equal that of a six; (*b*) highest pressure in the "six"; (*c*) average pressure; (*d*) variations in actual pressure; (*ps*) indicates power stroke.

Four-Cylinder (below): (*b*) highest pressure; (*c*) average pressure; (*d*) variations in actual pressure; (*ps*) power stroke.

or gas is drawn into the cylinder of the engine by the suction of the piston, and when the piston returns is compressed. Either just before or at the moment of greatest compression, the mixture is ignited, thus causing the gas to expand. The expanding gas drives back the piston, the piston communicates power to a crank shaft, and from the crank shaft through



A "SOCIAL ROADSTER"

Before the year 1916 "roadsters" would seat but two people. In that year models seating three and four were designed, by adding a rear seat with narrow space for the feet back of the front seat and shortening the carrying space in the body. This style persisted only a few years.

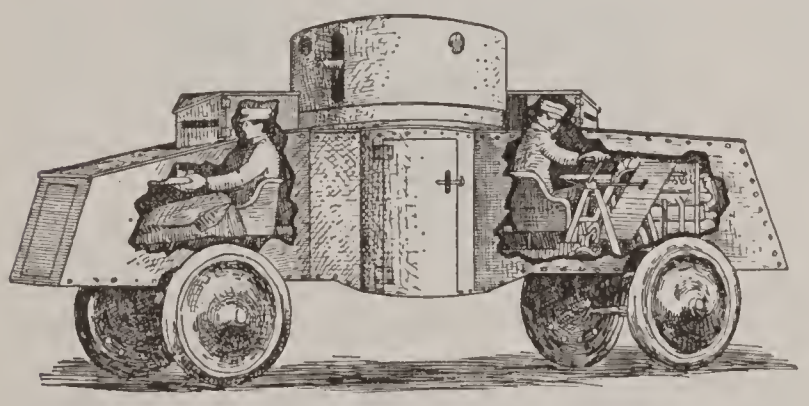
an elaborate mechanism (called the transmission) to the wheels. For details of this process see CARBURETOR; GAS ENGINE. The first automobiles made had only one or two cylinders. Later the number was increased to four, then to six, eight and twelve. Explosions in these cylinders do not take place at the same time, but one after another in regular succession. (See diagram.) It is obvious that the more cylinders there are the greater is the power of the car.

Electric Automobiles. The electric automobile owes its present development to Thomas A. Edison. It differs from the steam and internal-combustion type in its essential feature; it operates with power generated elsewhere and stored in it, whereas the steam and gasoline engines themselves generate the power which runs them. The motive power in an electric automobile is furnished by a storage battery (which see), which must be recharged from time to time. Places where electrical energy can be easily obtained are usually limited to cities, and a single charge is sufficient for only sixty to 100 miles. The speed of an electric automobile is less than that of the gasoline type; it seldom exceeds fifteen to twenty miles an hour. On the other hand, it has the decided advantage that it is cleaner, quieter and easier to operate than a gasoline car; for these reasons it has become a favorite for city use, especially for women.

The Automobile in War. Along with its increasing usefulness in peace has been the

development of the automobile for military purposes. In a small way motor vehicles had been used by the British in the South African War (1899-1902), by the Italians in Tripoli in 1912, and by the Bulgarians in the Turko-Balkan War in 1912-1913; but it remained for the War of the Nations in 1914 to demonstrate that the automobile, perhaps more than any single weapon of offense or defense, has entirely changed the character of war. When Napoleon once remarked that an army fights on its stomach, he meant that its movements are dependent on the mobility of its food-supply. Once it was frequent occurrence for an army to wait for its supply trains, and Frederick the Great is known to have altered his plan of campaign on several occasions in order that his troops might keep close to their food supplies. Now it sometimes happens that the transport trains wait for the army, and rare are the instances in which food and ammunition fail an army because of poor transportation.

The automobile has made possible the rapid movement of men and supplies on a scale hitherto believed impossible. It has brought tons of food and ammunition to millions of men under circumstances in which horses could have



ARMORED AUTOMOBILE

Average type of automobile used in offensive attack in the War of the Nations.

brought only pounds to thousands. It has made possible more rapid attacks and retreats, and has unquestionably brought death to added thousands of men. On the other hand it has saved thousands of lives, for men who otherwise would have lain on battlefields for hours or days have been transported almost in the twinkling of an eye to hospitals far from the firing line. Within ten days after the beginning of the war, the nations under arms were using over a quarter of a million automobiles in the field, and the number constantly increased as fast as factories at home and in the United States and Canada could finish new ones. They are used for every conceivable purpose, and everything movable is moved by gasoline if possible. There are light scout-cars, and heavy armored cars, ambulances, repair-shops and gasoline-tanks on wheels. There are motor-kitchens, motor operating-rooms and hospitals, and giant tractors drawing siege-guns or supply wagons by the score. There are automobiles carrying machine-guns, aeroplane guns, or heavy artillery, and there are others which are really small forts mounted on wheels. In place of the brave courier who rode a breathless horse the despatch carrier now rides in a puffing automobile. From generals to privates the whole army rides in automobiles when speed is necessary, and the horse has almost completely disappeared from the battlefield and its surroundings. France credits the automobile with the defeat of the first German "drive" upon Paris in September, 1914, when in a single night 60,000 troops were transferred by motors from Paris to the battlefield, forty miles distant, to oppose the invaders at a critical point at sunrise.

Late in 1916 the British forces in France surprised their German foes by producing great armored tractors, weighing over 20,000 pounds and heavily armed, which could travel on "caterpillar" wheels over destroyed trenches and broken walls. Machine-gun and rifle fire could not injure the occupants. W.F.Z.

Consult Dyke's *Automobile and Gasoline Engine Encyclopedia;* Russell's *Automobile Driving Self-Taught;* Manly's *Modern Motor Car.*

AUTONOMY, *aw ton' o mi,* a term derived from two Greek words which mean *self* and *law;* therefore it is applied to a state or community which governs itself. In other words, autonomy means freedom in government. As now used it relates particularly to the freedom of a country to manage its own affairs when it is under the control of another country. Canada is a colony of the British Empire, and so far as its relations to foreign countries are concerned is subject to control by the British government, but in all matters pertaining to its own affairs it has perfect freedom, or autonomy. The relation of the various states of the American Union to the Federal government illustrates the same principle; each state is free to manage its own affairs, but beyond this its government cannot go, for interstate affairs are under control of the national government.

AVALANCHE, *av' a lanch,* from the French idiom, *avalance,* meaning *descent,* is the name given to masses of snow or ice that rush down mountain sides. They travel with great force

and destroy trees, buildings, men and animals—everything in their path. When in winter the mountain sides become overloaded with fine, dry snow, these great snow caps may be started to lower levels by strong winds. They are known as *wind avalanches. Ice* or *summer* avalanches are great masses of ice detached by thawing from the high glaciers, and they occur in the warmest season. *Sliding avalanches* are masses which become too heavy for their support and, breaking away, crash to lower levels. Avalanches, also called landslides, which occur in summer are sometimes composed of melting snow and large areas of loosened earth. All avalanches take place so quickly that people seldom have time to get out of their way. Especially fatal are those that pour over high cliffs into valleys below. Two immense avalanches which occurred in the Italian Alps in 1885 contained 45,000 and 250,000 tons of snow, respectively.

The word is widely used in a figurative sense to indicate a mighty force which one cannot withstand. Thus, it is proper to say, "An *avalanche* of words silenced his opponents." One should guard against using the term when it exaggerates the facts.

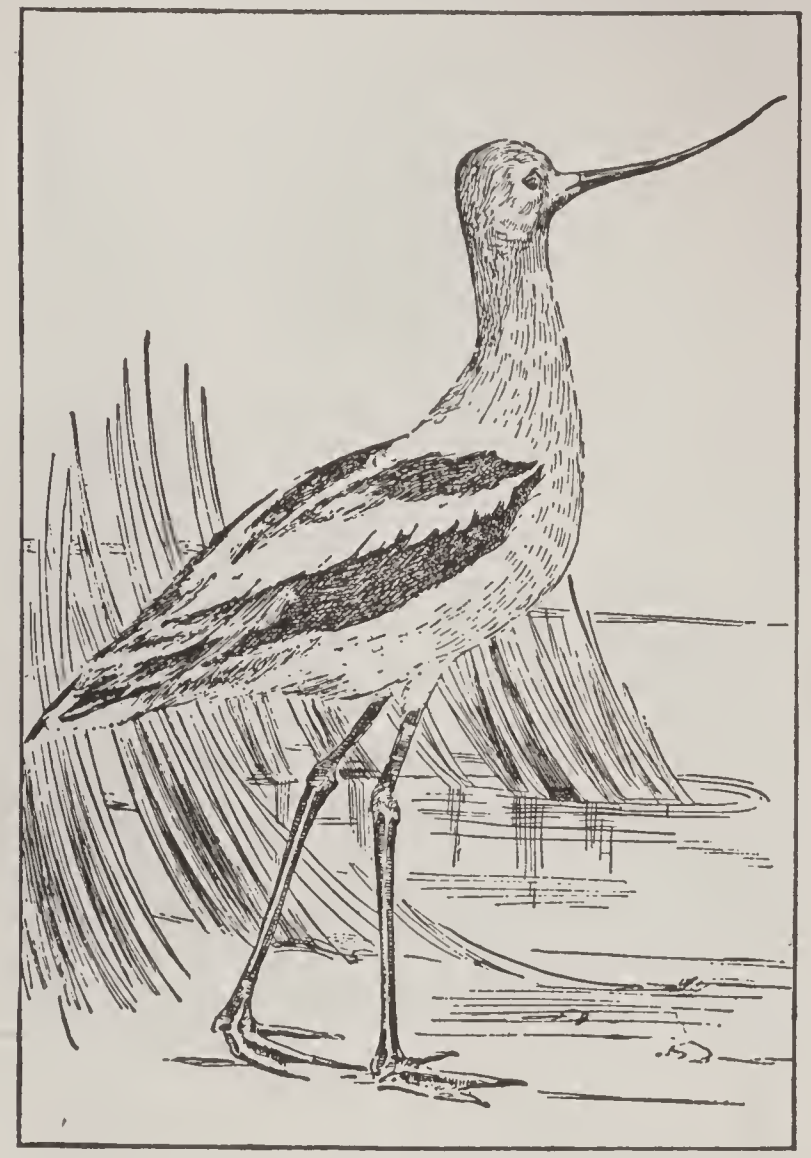
AVE MARIA, *ah' va mah ree' ah* (Latin Hail Mary), in the Roman Catholic Church, a form of prayer expressing honor to the Virgin and asking her intercession. The words are chosen from the beginning of the angel Gabriel's salutation to Mary, *Hail, full of grace, the Lord is with thee* (*Luke* I, 28). The prayer has been set to music by a number of famous composers, among them being Liszt, Schubert and Gounod, the composition of the last named being the one most frequently sung.

AVERNUS, *a vur' nus,* a lake occupying an extinct crater in Campania, Italy, about eight miles west of Naples. According to mythological lore, it formed the entrance to the lower regions, through which Aeneas and Ulysses descended and through which Pluto carried Proserpina, his stolen bride. In former times it was gloomy and forbidding, surrounded by dense forests and covered with a column of sulphurous vapor which was said to destroy all birds attempting to fly over its waters. In consequence of this belief the Greeks called the lake *Aornis,* a word meaning *without birds.*

The modern name is Lago d'Averno, and the neighborhood is bare and desolate. The lake is about two miles in circumference and has a depth of 180 feet. (See the articles on mythological personages named above.)

AVESTA, *a ves' ta.* See ZEND-AVESTA.

AVOCET, or **AVOSET,** *av' o set,* a long-legged bird which wades in the marshes of Europe and America, migrating to the north in spring and to the south in autumn. Its distinguishing characteristic is its long, slender



THE AVOCET

bill, which is elastic and bent upward at the tip, serving as a scoop with which to dig worms and small shell-animals from the mud. The plumage is brownish-black above and white below, the head, neck and chest being a light brown. The bird is about seventeen inches in length. It is considered a good game bird in some parts of its range.

AVOIRDUPOIS, *av er du poiz',* from old French words meaning *goods of weight,* is a system of weights used for all ordinary coarse articles of commerce, such as coal, grain, foodstuffs, and the like. A pound avoirdupois contains 7,000 grains, divided into 16 ounces, as compared with 5,760 grains, or 12 ounces, troy or apothecary weight. The latter are used in weighing precious metals, gems and medicines. In the three kinds of weights the grain, the basis of computation, is unvarying.

AVON, *ay' von,* a name made famous through its connection with the greatest name in the world's literary history. There are in

England several small rivers called Avon, but the world is interested in only one, the Upper Avon, on which is Stratford, the birthplace of Shakespeare, the "Swan of Avon." This stream, ninety-three miles in length, rises in Northamptonshire, flows through one of the most beautiful valleys in all England and falls into the Severn at Tewkesburg.

AXIOM, *ax' i um,* a statement so general in its use that it is accepted without proof. Our text-books almost without exception define it as "a self-evident truth." With simple accepted facts as a basis all other obtainable truth is searched for. It is used to apply to mathematics more generally, but by the Greek philosophers, it was applied to all general notions.

Euclid assumed fifteen axioms as the basis for geometry. Among these are the following:

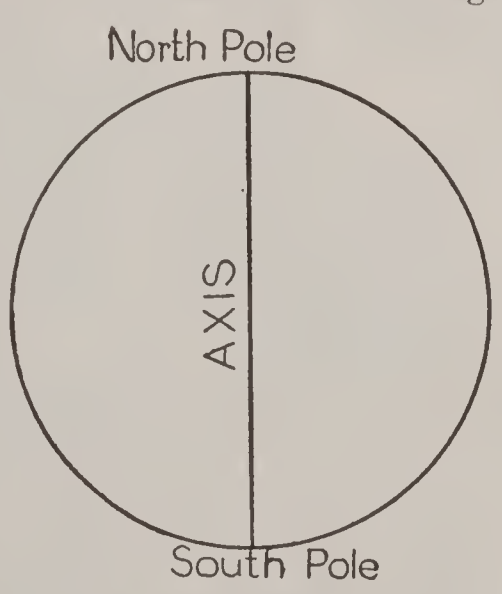
(1) Equal quantities added to equal quantities produce equal quantities.

(2) A whole is greater than any of its parts.

(3) Things equal to the same thing are equal to each other.

(4) Magnitudes which coincide are equal to each other in every respect. See ALGEBRA; GEOMETRY.

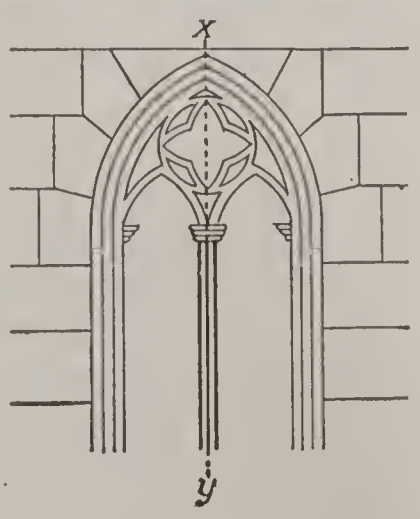
AXIS, an important term in botany, anatomy and mathematics. It is a real or imaginary straight line passing through a body or magnitude, on which the latter revolves, or may be supposed to revolve.



In *astronomy* the word is used to indicate the center around which the earth rotates. The axis of the earth has for its two extremities the North Pole and the South Pole.

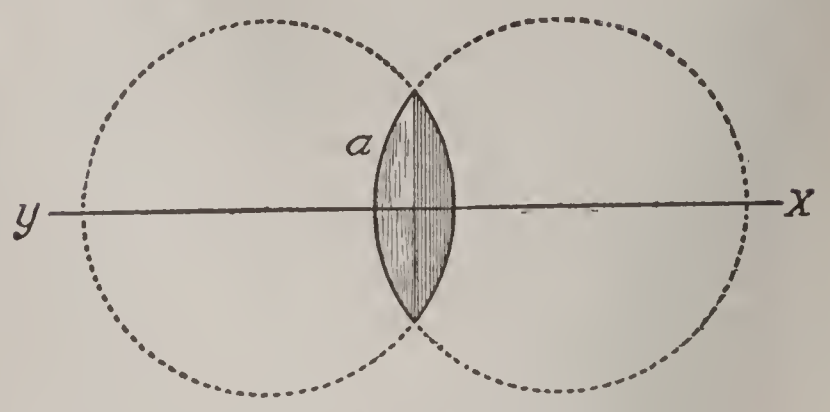
In *botany* the word is also used, the stem being termed the *ascending axis,* the root the *descending axis.*

In *anatomy* the name is given to the second vertebra from the head, that on which the *atlas* moves (see VERTEBRA).



x y is axis of arch.

In *mathematics* an axis is the straight line about which the parts of a figure or body are symmetrically arranged.



x y is axis of prism *a.*

AYE-AYE, *i' i',* a mammal of the lemur family, found in Madagascar, so named from the cry of surprise which the natives give when they see the animal, which they superstitiously reverence. The aye-aye is about as large as a

THE AYE-AYE

rabbit, and though a close relative of the monkey, resembles the squirrel in some particulars, especially its long, strong teeth and its bushy tail. It has large eyes and ears, and is brown. Its most peculiar characteristic is a long, narrow third finger, with which it is thought to drag insects from their burrows. Like all of its family it is a creature of the night. Its nest of twigs is built in a high tree in the densest part of the jungle.

AYLESWORTH, *ayls' werth,* SIR ALLEN BRISTOL (1854-), a Canadian lawyer and Liberal statesman, one of the leading authorities on electoral and constitutional law in the Dominion. He was born at Newburgh, Ont., attended Newburgh Academy and the University of Toronto, from which he was graduated in 1874, and was called to the bar in 1878. He soon became a prominent lawyer, and on numerous occasions appeared in cases of great importance, notably in 1904, when he successfully represented the old provinces of the Dominion when the effort was made to reduce their representation in Parliament. In

1903 he was one of the commissioners appointed to settle the Alaska boundary dispute, and together with Sir Louis A. Jetté refused to sign the award. In 1910 he prepared the case for the British colonies in the Atlantic fisheries arbitration by The Hague Tribunal. Meanwhile, in 1905 he was elected to the Dominion House of Commons, was at once appointed Postmaster-General in Laurier's Ministry, and was Minister of Justice from 1906 to 1911, when he retired from public life. He received the honor of knighthood in the same year.

AYLMER, QUE., a town in Wright County, eight miles west of Hull, with which it is connected by the Canadian Pacific Railway and by an electric railway. It is located on the north shore of Lake Deschenes, an expansion of the Ottawa River. Aylmer is of little importance industrially, greenhouses and saw mills being the most important establishments; it is rather a residential suburb of Hull and Ottawa, which lies across the river from Hull, and is also popular as a summer resort. Two-thirds of the people are French-Canadian. Population in 1911, 3,109; in 1921, a decrease to 2,970. A.M.

AYLMER WEST, ONT., a town in Elgin County, twelve miles east of Saint Thomas, and 110 miles east of Detroit, on the Grand Trunk, Wabash and Michigan Central railways. The Catfish River, which is not navigable, flows through the town. Aylmer West lies in a rich farming and dairying region, and among its chief industries are canneries and condensed milk factories which utilize farm products. There are also several saw and planing mills, a shoe factory, pump and scale works and other manufacturing interests. The development of the town will be greatly stimulated by the use of hydro-electric power, which the provincial hydro-electric power commission is planning to install. The local Dominion post office, erected in 1912 at a cost of $50,000, is a noteworthy building.

Aylmer West was founded in 1809 and was incorporated as a town in 1887. Population in 1911, 2,102, mostly native Canadians; in 1921, 2,194. W.J.M.

AYR, *air,* a seaport, summer resort and county town of Ayrshire, Scotland, famed for its associations with the poet Robert Burns, whose birthplace, the village of Alloway, lies two and one-half miles to the south. The old town of Ayr lies at the mouth and on the south bank of the River Ayr and on a beautiful bay of the Firth of Clyde, the shining, sandy beaches of which are an attraction to thousands of visitors each summer. About forty miles to the northeast is the city of Glasgow. Three bridges span the river, the Victoria Bridge, built in 1898, and the "Twa Brigs" that Burns made famous in his poetry.

BURNS' MEMORIAL

Ayr itself is rich in historical associations. In the twelfth century it was made the royal residence of the Scottish kings, and during the wars for independence was the scene of many fights between the English and the followers of William Wallace. When Cromwell invaded Scotland he built a fort in Ayr that covered ten or twelve acres, using for a storehouse the famous old Saint John's Church, where in 1315 the Scottish Parliament met to confirm the succession of Edward Bruce to the throne.

South of the town is a famous race-course, and three miles north is Prestwick, a well-known summer resort and the headquarters of a popular Scottish golf club. Alloway, however, outshines all of the outlying towns in point of interest. The "auld clay biggin," the cottage where Burns was born, a picture of which accompanies the article on the poet, has been bought by the Ayr Burns's Monument trustees, and visitors may view therein many articles of furniture once used by the Burns family. Near-by is the "auld haunted kirk," now without a roof and deprived of all of its

woodwork by relic-hunters. On the banks of the river that Burns so often refers to as the "bonnie Doon," a monument to the poet has been erected, and a grotto close by contains the sculptured figures of Souter Johnnie and of Tam O'Shanter, the latter recalling the poem in which this famous character drank too freely and was assailed and pursued by spirit figures.

AZALEA, *a za' le a.* Under this name are grouped some of the most beautiful of garden and hothouse flowers, as well as wild flowers. They are kin to the rhododendrons—indeed, some botanists class the two as one genus. There are in North America many species of azaleas, some evergreen, some having leaves which fall in the autumn, but all are distinguished by their showy trumpet-like flowers, which usually have an extremely pleasant scent. Their colors range through all shades of pink and red; also white, yellow and purple azaleas are by no means uncommon.

AZALEA

Azaleas furnish a most interesting example of the way in which nature adapts means to an end. That the flowers may be fertilized, bees and butterflies must visit them, and honey is provided to attract them. But ants, which are of no help in distributing pollen, like honey, too, and that they may not steal it many of the azalea blossoms are provided with sticky hairs, past which these invaders cannot crawl.

AZERBAIJAN, *a zer' bi jan,* one of three new republics formed from the former Russian province of Transcaucasia. It extends from the Caspian Sea westward to a point nearly midway between that body of water and the Black Sea. Its boundaries are quite irregular; the area is about 40,000 square miles, about that of Ohio, and the population is estimated at 4,615,000. The country in 1921 definitely embraced bolshevism, although the Russian influence had made it bolshevik in fact a year earlier, and is now officially known as The Soviet Republic of Azerbaijan.

THREE NEW NATIONS

Within Armenia and near the boundaries of the other two countries lies a neutral zone (a).

The republic has one great city, Baku, the capital and the center of a vast petroleum industry. Three-fourths of the people are Tartars.

AZOIC, *a zo' ik,* **ERA,** a term formerly used by geologists to describe a period in the earth's history in which plant and animal life did not exist. The earliest era of geologic history is now known as the Archeozoic Era, and its rock formations are called Archean (see Archean System). As late investigations disprove the theory that there was an earlier period without life, the term is no longer used. See Geology.

AZORES, *a zorz',* or **WESTERN ISLANDS,** a group of nine rocky and lofty islands in the North Atlantic Ocean, belonging to Portugal. They form three distinct groups; the northeast consists of the islands of Sao Miguel (Saint Michael) and Santa Maria; the central, of Fayal, Graciosa, Pico, Sao Jorge and Terceira, and the northwestern, of Corvo and Flores. The Azores are farther from any continent than any other group of islands in the Atlantic Ocean, the African coast being 900 miles to the east and Newfoundland more than 1,000 miles to the west.

The volcanic origin of the islands is proved by numerous hot springs and frequent earthquakes, even in modern times. The hills and valleys are clothed with luxuriant vegetation, and corn-fields, vineyards, lemon and orange groves and rich open pastures are found wherever the land has been cleared of timber. The climate is mild and somewhat humid; but as a winter resort the islands are very popular.

The Azores were discovered by Cabral about 1431, shortly after which date they were taken

possession of and colonized by the Portuguese. When first visited they were uninhabited and had scarcely any animals except birds, particularly hawks, called in Portuguese *acores,* to which the islands owe their name. The capital is Angra, on the island of Terceira. It has the only good harbor in the entire group. Here resides the Governor-General of the islands, who receives his appointment and authority from Lisbon. Population, 256,475.

AZOV, *a zawf',* SEA OF, a large inland sea, which the Strait of Kertch connects with the Black Sea, of which it forms an arm. About 200 miles long and 100 miles wide, it covers approximately 14,500 square miles, or an area two-thirds that of Lake Michigan. Its greatest depth is fifty-three feet. Its western end, called the Putrid Sea, is separated from the main expanse by a long sandy belt called *Arabat,* along which runs a military road. About 2,700 vessels, totaling 500,000 tonnage, visit its ports annually. Numerous storms, its shallowness, and ice in winter render navigation dangerous. The Don and other rivers enter it, and its waters are quite fresh. The sea teems with fish.

AZTEC, *az'tek,* a word in their own language meaning the *heron clan,* is a nation of Indians which built up in the southern part of

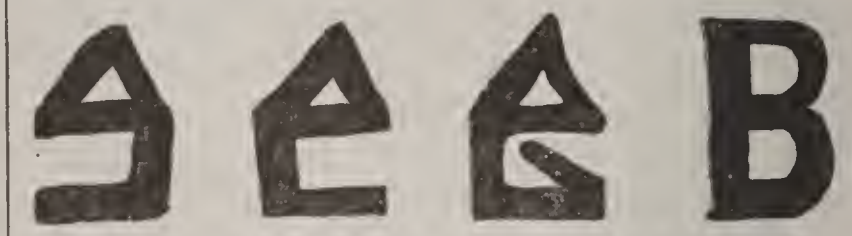
AZTEC CALENDAR STONE

the North American continent a fairly high civilization centuries before the white man ever made a settlement there. When Cortez (which see) reached Mexico early in the sixteenth century he found that all the southern tribes had been made subject to the Aztecs, who ruled from their central city, Tenochtitlan, now the City of Mexico. One of their deities, Quetzalcoati, whose appearance on earth they constantly expected, was supposed to be a "fair god," and when this first white man, Cortez, came, they showed a readiness to worship him. But they speedily found that he had come not as a beneficent god but as a conqueror, and under their ruler Montezuma they offered a stubborn, though vain, resistance. Lew Wallace's *Fair God* deals somewhat inaccurately with the legends about Quetzalcoatl; Prescott's *Conquest of Mexico* tells the absorbing tale of the conquest, although it exaggerates very greatly the development of the Aztec civilization.

The Aztecs, of whose origin nothing is known, seem to have lived in Mexico from the twelfth or thirteenth century. They learned much from the Maya Indians of Yucatan, but much of their civilization they developed themselves, and they showed a considerable knowledge of agriculture, architecture, sculpture and various useful arts. Maize and the agave were cultivated, and their feather work, weaving, and pottery showed a high degree of skill. To record events they used a complicated picture-writing, and they had a lunar calendar of unusual accuracy. Their temples, much like the Pyramids of Egypt in form, were in charge of a nmerous priesthood, for the Aztecs were very religious. This, indeed, was the basis of their worst fault, for their religion demanded of them human sacrifices, and each year thousands of slaves or prisoners of war were put to death with the most incredible cruelty.

To-day there are living in the villages about the City of Mexico many thousands of descendants of these Aztecs, who have lost the civilization of their ancestors but stubbornly refuse to acquire a new one from their European neighbors, the Spanish conquerors. The present-day Aztecs are a harmless, timid people. It is impossible to determine what proportion of the great Indian population of Mexico is descended from the Aztec group. L.F.

Bb



B, the first consonant and second letter in all alphabets which may be traced back to the Phoenician (see ALPHABET). Its name in the Phoenician alphabet was *beth,* which meant house, and in its form it suggested a crude picture of a house, with one side left open as a doorway. Gradually, as it was adopted by the Greeks, it was turned about, its straight lines were softened to curves, and it became the familiar capital B. This letter, pronounced only by the lips, is distinguished from *p* in that both the voice and the breath are used in producing it. It often happens that the *b* of one language is replaced by *p* in a related language, especially when it is the last letter of a word or syllable.

BAADER, *bah' dur,* BENEDICT FRANZ XAVIER VON. (1765-1841), a German Roman Catholic philosopher, religious writer and mining engineer, the discoverer of a new method of making glass, by which Glauber's salt instead of potash is used. He was born in Munich and educated in Vienna. He worked for several years as a mining engineer, and won a prize of about $5,000 for the discovery in regard to glass-making. Meantime, however, he had become interested in philosophy, and in 1822 published a work on that subject that gained a good deal of attention, and is yet read by many churchmen.

In 1826 Baader was made professor of philosophy and theology at the University of Munich, but twelve years later, having openly stated that the Catholic Church had no right to interfere in matters not religious, he was forbidden to lecture on the philosophy of religion. He had also opposed the Papacy as an institution. In spite of his disagreement with the Church leaders, he is looked upon to-day as one of the greatest Catholic writers on theology.

BAAL, *ba' al,* a Hebrew word meaning *lord,* has been applied to a great many different gods. The people of Canaan and Phoenicia gave its name to various local gods, adding the name of a town or other place to show what particular Baal was meant. Thus there was a Baal of Tyre, of Sidon, of the Lebanon, etc. Sometimes a Baal was distinguished by some special quality, as Baal-zebub (the fly-god), whom the Philistines worshipped. While there were as many Baals as there were towns or places of worship, a few Baals became very important, especially the Baal of Babylonia, more commonly known as Bel. When the Hebrews settled in Canaan they took up the worship of the Baals, and even gave the name to Jehovah. It was this corruption of the true worship that aroused the anger of Elijah and the prophets who followed him. Consult a *Concordance to the Bible* for references.

BABBITT, *bab' it,* **METAL,** a soft metal resulting from melting together four parts of copper, twelve parts of tin and eight parts of antimony, adding twelve parts of tin when the mixture is fully melted. It is used with the view of obviating friction as far as possible in the bearings of journals, cranks and axles. Babbitt metal was invented by Isaac Babbitt, a goldsmith of Boston, Mass., from whom it takes its name.

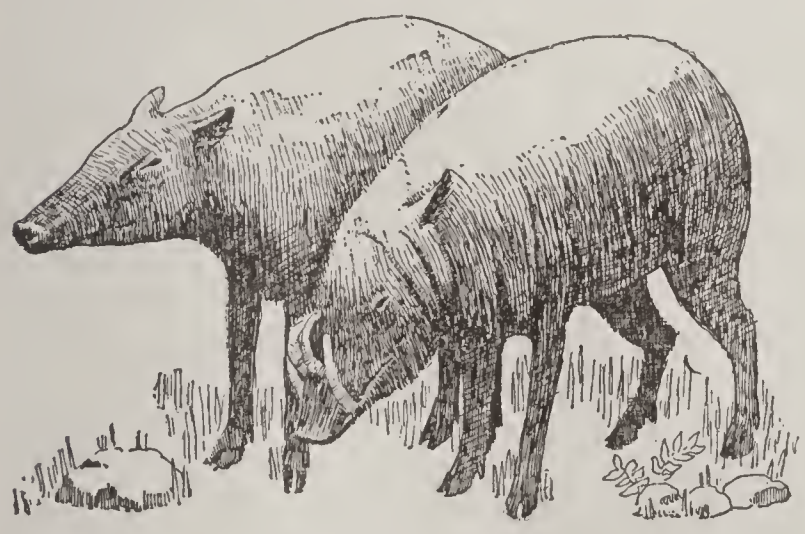
BABEL, *bay' bel,* TOWER OF, the place where the confusion of the tongues of mankind took place, as related in *Genesis* XI. In this story the descendants of Noah, after the Flood,

wandered to the plain of Shinar, in Mesopotamia, and began to build a tower which should reach to heaven; but Jehovah caused their "speech to be confounded," so that no man understood his neighbor, and the work was left unfinished. The word *babel* has been adopted into the English language to express a confusion of sounds, but it means *gate of God,* and not *confusion,* as is usually supposed. The Tower of Babel has been identified with one of the important buildings of ancient Babylon, the great temple of Belus (or Bel).

BAB-EL-MANDEB, a strait connecting the Red Sea with the Arabian Sea and the Indian Ocean, and separating the Arabian peninsula, at the extreme southwest, from the continent of Africa. The name, meaning *gate of sorrow,* was applied to the strait because it has always been a dangerous channel for small sailing ships. The shore rises high on both sides, for on the east the strait is bordered by the cape of the same name, 865 feet in altitude, and on the west by the steep African coast, reaching its highest point 400 feet above the sea. Not far from the African shore is a group of volcanic islets called the Eight Brothers. An island in the strait divides it into two channels, of which the one on the east, two miles wide, affords the better anchorage.

BABES IN THE WOODS, a favorite nursery tale about two children who were left to die in the forest by a wicked uncle. As they lie down to sleep the robins cover them with leaves. The origin of the story is unknown.

BABIRUSSA, or **BABYRUSSA,** *bab i roo' sa,* a Dutch word meaning *pig deer,* is the Malay name for the wild hog. It has a rough and nearly-naked skin, and inhabits Celebes, Buru and other East Indian islands. It does not



BABIRUSSA
Male and female.

root in the ground as do other members of its family, but feeds upon fallen fruit and vegetables. The male is remarkable for the curious growth of its upper canine teeth, which extend upward through openings in the skin on each side of the snout and curve backward nearly to the eyes, then downward and forward again. The flesh is highly esteemed by the natives and is said to be more delicate in flavor than pork. In some sections of its range the animal is nearly exterminated.

BABOON, *bab oon',* an ape distinguished by its long, dog-like muzzle. In ancient Egypt the baboon was regarded as sacred, and divine honors were paid to it on account of its sup-

BABOONS

posed superhuman wisdom. Its deep-set eyes, heavy eyebrows and serious-looking mouth give the animal an expression which could easily give rise to such a superstition.

Most baboons are about the size of a large dog. Their four legs are nearly equal in length and are all used in walking; in fact, it is difficult for a baboon to hold itself upright in the familiar attitude of other monkeys. Strong tusk teeth, large flabby cheek-pouches and long tails are other characteristics of the animal. It is usually a sullen creature, which defends itself by hurling stones or other handy missiles, but in Celebes is found a species of smaller stature which is quite amiable. This is the species usually seen in captivity.

Baboons live in herds and eat fruits, roots, eggs or insects. In South Africa the *pig-tailed* baboon or *chacma,* which lives in rocky regions because it is a poor tree climber, is fought by the natives because of the damage it does to crops. This type is grayish brown, with long shaggy hair. The *hamadryad* of Abyssinia, the species once held sacred, has a cape of hair about its shoulders. See MANDRILL; MONKEY.

BABY, THE. A public awakened to the necessity of saving the babies—this is the outcome of one of the most important educational movements of the present time. The high death-rate among babies (see INFANT MORTALITY) was long regarded as a condition that could not be remedied. Babies were believed to be "hard to raise," and it was expected that about one out of every five would die. People are wiser than they used to be. They have been brought to see that enlightened, intelligent care of infants is certain to lower the death-rate, that the babies are the material out of which future citizens are made, and that healthy children are a nation's most valuable asset. In France, where the declining birth-rate made it absolutely necessary to save as many infants as possible, the baby-welfare movement was first placed on an organized basis. The results achieved there were brought to the notice of health authorities and social workers in other countries, and since the last decade of the nineteenth century the slogan, "Save the babies," has come to stand for a world-wide movement.

In the United States the leadership in the work was taken by the American Association for Study and Prevention of Infant Mortality (organized in 1909 with headquarters in Baltimore, Md.), and the topic has also been made the object of special investigation by the Federal Children's Bureau (see CHILDREN'S BUREAU). Instruction and information are now reaching mothers and others who are interested, through various channels. Numerous pamphlets, books and magazine articles on the subject have been issued and continue to come from the press; infant-welfare societies for practical work in homes and neighborhood centers have been organized, and in many communities baby "conferences" are held, at which the babies are examined and given marks on points of mental and physical development. These are sometimes known as "contests," but best authorities prefer the other term.

The Baby's Heritage. The leaders in infant-welfare work have not forgotten the ancient law that the sins of the fathers are visited upon the children "unto the third and fourth generation." They recognize the right of the baby to be well-born, and they preach the doctrine that diseased parents cannot produce healthy offspring. The special science that has to do with "better parents" is therefore inseparably bound up with the better-babies movement. It is known as EUGENICS, and is fully discussed in these volumes under that title.

Another and no less important phase of this movement is the care needed by the expectant mother before the baby comes. Her habits and the conditions surrounding her are vitally related to the welfare of the child. No mother can expect to have a strong, vigorous child if she is overworked, worried, unhappy or ill-nourished. Her diet should be most carefully selected because her own general condition and that of the baby are based upon it. This diet should include soups, fresh fish, eggs, cooked cereals, with cream, milk and sugar, potatoes, asparagus, tomatoes, peas, Lima and string beans, spinach, celery, lettuce, whole wheat, bran, Graham or corn bread, ripe raw fruits or cooked fruits. Only light meats should be eaten, and these very sparingly. Simple puddings, like custard, and pure ice cream are permissible. Pure water should be drunk freely, between meals; sweet milk, buttermilk, cocoa and chocolate are nourishing, milk being especially good for an expectant mother. She should not drink more than one cup of tea or coffee a day, and should avoid all alcoholic drinks, rich desserts and highly-seasoned foods. There is no foundation of fact in the belief, somewhat prevalent, that beer is beneficial.

It is best for the expectant mother to bathe

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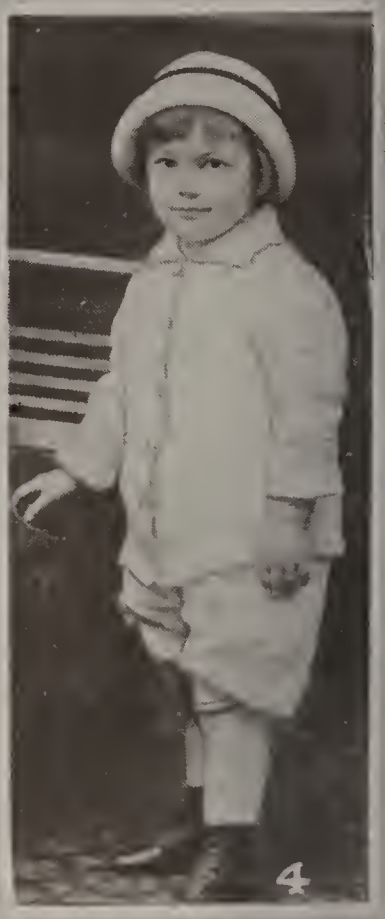
1, William Howard, Washington; 2-3, Rachel and Mary Beardslee, Washington; 4, Mildred Mullins, Oregon; 5-6, James and Mary Billings, Michigan; 7, Caroline Clemmer, Indiana; 8, Than Seaman, Texas; 9, Mary Jane Potter, Illinois; 10, Florence Levy, Texas; 11, Robert Larson, North Dakota; 12, Helen Cochran, Indiana; 13, Bartram Warshaw, Illinois.



1-2, Jean and Gwen Lucia, Iowa; 3, Richard Maxwell, Indiana; 4, Calvin Murray, North Carolina; 5, Mary McAlpine, California; 6, Kenneth Campbell, Ohio; 7, Frances Robinson, Illinois; Marian Sonneman, Wyoming; 9, Mary Jane Hussey, Missouri; 10, Margaret Firestone, Indiana; 11, Florence Kennedy, Wyoming; 12, William Sass, Washington; 13, George Zoller, Illinois

daily, in order to keep the pores in such a condition that they will do their share of the work of throwing off waste matter. Very hot or very cold baths are not advisable. Inhaling fresh air is quite as essential as bathing, for the lungs need oxygen as much as the body needs the cleansing medium of water. It is highly important, also, to keep the bowels moving every day. All the household tasks should be performed in well-ventilated rooms, and the sleeping room should be especially looked after in this matter. If possible the expectant mother should have an outside bedroom. Eight hours of sleep at night and a daily nap or rest period are essential. Violent exercise and laborious work of any sort should be avoided, but the muscles must not be allowed to grow flabby and weak through inaction. A daily walk in the open air and such household tasks as are not tiring may be continued to the last. The clothing should be loose and comfortable, and lacing be avoided as dangerous to both mother and child. It is also unadvisable to wear tight gloves or shoes.

The child of clean, healthy parents, with wholesome mental and physical habits, will be certain to possess the heritage of the well-born —a strong mind in a strong body.

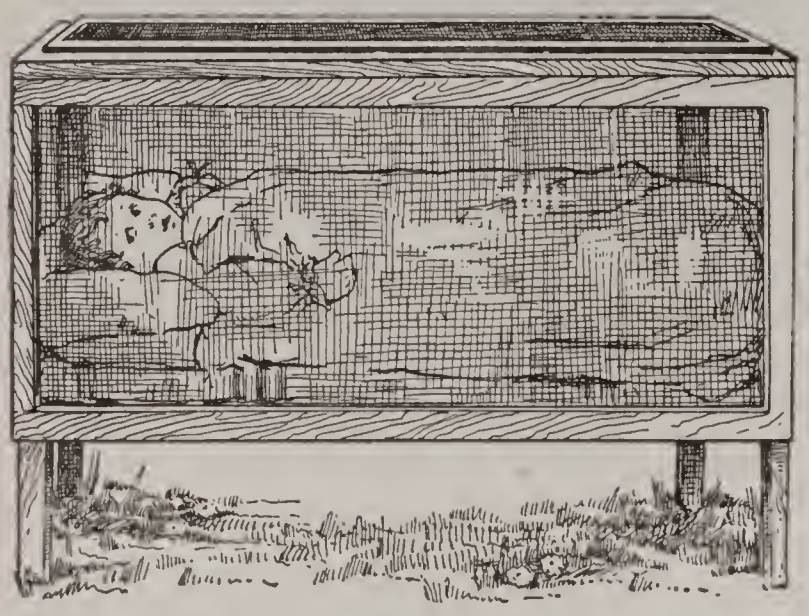
Care of the Baby

There is nothing more helpless than a newborn infant. At the time of birth and for many months afterward it is absolutely dependent on others for everything. For this reason the care given the young child should be intelligent and systematic. The suggestions that follow apply, of course, to the average normal child. A sickly baby must have treatment and care which can be prescribed only by a physician familiar with the child's special needs. The baby who comes into the world in good health will develop normally if adequate attention is given to such essential matters as cleanliness, fresh air, sleep, hygienic clothing and habits, and proper feeding.

Cleanliness. The daily bath not only adds greatly to the baby's comfort, but is necessary for its healthful development. After the child is ten days old it should be bathed in a little tub of its own. For the average baby the water should be at a temperature of 100° F. during the first eight weeks; it may then be lowered to 98°, and from the seventh to the twelfth month may be kept at 95°. During the second year a temperature of 85° to 90° is advisable. The mother should see that baby has a tub, wash cloths, towels and soap of his own, and that these are kept scrupulously clean. Sponges are liable to become breeding places for germs, and can well be dispensed with. The young baby has tender skin and should be patted, not rubbed, dry. In some cases the use of water is postponed until the third week, oil being used instead. Just as soon as the first teeth come they should be brushed with a small soft brush; unless the mouth becomes infected it need not be washed until the teeth come through, for pressure upon the developing teeth may break the delicate mucous membrane. After the teeth appear the mouth should be washed daily. The clothing should be kept dry and clean, and be washed only with pure soap. Thorough rinsing is far more important than starching. Everything about the child should be clean and sanitary—the furnishings of its bed and carriage, its toys and the people who care for it.

Fresh Air and Sleep. No baby will thrive without an abundance of pure fresh air. Except in severe winter weather the child should be taken out for a daily airing; when bad weather prevents this, it should be dressed warmly and the windows of the nursery be thrown wide open for a half hour or more. If the carriage or crib is placed near a window and protected from drafts, the good effects of the outdoor airing may be had indoors. It is

highly important that the sleeping room of the child be thoroughly ventilated, and open windows will not give the child a cold if precautions are taken in regard to drafts. If there is danger that the wind will blow on the baby a



HOME-MADE SLEEPING BOX

screen should be placed before the crib. In the summer outdoor naps are excellent for the child, and a simple bed for the purpose can easily be made by anyone familiar with tools. This is essentially a box with a hinged top, set on strong rollers and having sides of wire or cotton mosquito netting. Wherever baby sleeps, he should be protected from flies and mosquitoes.

During the first month the child should sleep twenty hours a day, and then sixteen hours a day until the end of the first year. Daily naps should be continued for several years. If it can possibly be arranged the baby should sleep in a bed and a room of its own. The practice of having an infant sleep with its mother is most unwise and is strongly condemned by all experts. Another unwise practice is that of rocking the child to sleep. It is quite unnecessary to begin that way, and the habit if once acquired is hard to break. It is better to lay the little one in its crib in a cool and quiet place, see that it is comfortable, and let it become accustomed to going to sleep alone. Pacifiers and other devices for putting children to sleep are pernicious, and should not be tolerated any more than the soothing syrups and other patent mixtures that are frequently advertised.

Feeding. The ideal food for any baby, especially during the first few months, is milk from the mother's breast. Unless there are reasons which make it unwise or impossible to do so, every mother should nurse her child. Breast milk never sours and is at all times ready for use. It does not have to be prepared, cooked or measured, and it passes to the child's mouth directly from the source. It contains neither germs nor dirt and so is a protection against many baby diseases, especially bowel disorders. It is the only perfect baby food known, for it contains all the food elements needed by the growing child, and these are always found in their proper proportions. By taking certain precautions the nursing mother can protect her baby from the intestinal disorders that cause the death of so many infants. She must keep her own digestion in the proper condition, avoiding anything that may cause stomach and bowel trouble. She should eat nourishing food, drink plenty of pure water, have plenty of sleep and rest, exercise in the open air each day, avoid fretting or overworking, and be careful not to nurse the baby when she is herself overheated. The breasts should be carefully washed with water or boric acid after each nursing.

Babies should be nursed at definite intervals, for regular feeding means regular sleep. If necessary at first, the child should be wakened at nursing time; he will soon acquire the habit of waking voluntarily when it is time to be fed. Dr. L. E. Holt, the well-known baby authority, advises the following schedule: Beginning with the third day, the baby should be fed not oftener than every three hours between six in the morning and ten at night; during the night there should be but one nursing. After four months no night feeding after ten o'clock P. M. should be given, and after six months the day feedings should occur at four-hour intervals. Breast-fed babies should have cooled (not iced) boiled water to drink between feedings. In many cases the baby needs more than breast food after the first months, and it is advisable then to give one or two bottle feedings a day at the regular nursing periods. As a rule, breast feeding should be discontinued at the twelfth month.

Artificial feeding has become so general that authorities are giving a great deal of study to the subject. It is of course not always possible to feed the baby at the breast. In such cases the best substitute obtainable should be used, and that is clean, fresh milk from the cow. Every mother who feeds her baby from the bottle should insist on getting clean milk from a clean source. Milk delivered in bottles is the only safe kind, and city-dwellers should purchase *certified* milk. This is milk guaranteed to be produced under sanitary conditions and handled with special care. If there is ever

any doubt about the purity of the milk it should by all means be boiled. In the summer babies should not be given milk that is over twenty-four hours old, and in winter any that is older than forty-eight hours (see MILK).

The preparation of cow's milk for baby's use is a most important matter. Since it is stronger than the natural food from the mother's breast it must be *modified,* that is, adapted to the child's digestion. In many cases infants thrive on simple dilutions of milk with boiled water, to which a small quantity of sugar is added. Before the baby's food is prepared, however, the mother should consult a physician who is experienced in infant feeding and who understands her child's needs. She should follow his directions carefully, weigh the child regularly, and see that it is being properly nourished. Babies differ considerably in the matter of artificial feeding, and it is not possible to give a set of directions applicable to all. Bottle-fed babies are more liable to colic than those fed naturally, but this disorder can usually be prevented by rubbing the back of the child from the end of the spine upward, after each feeding.

One cannot be too careful in regard to the hygiene of artificial feeding. When the milk is delivered it should be put on the ice at once, for warm milk spoils easily and spoiled milk means a sick baby. All utensils required for preparing the food should be kept spotlessly clean, and it is a good idea to have a separate set of these for the baby's use alone. Round, plain bottles and plain nipples should be chosen, and these should be washed after each feeding. The old-fashioned bottle with the long tube is a breeder of disease and has no place in a "better baby's" equipment. The food should be prepared within twenty-four hours after delivery of the milk. As soon as it is ready it should be poured into the nursing bottles, which are then carefully stoppered and placed on ice. Each bottle should hold just enough for one feeding. When it is time to feed the child, warm the milk by placing the bottle in hot water. Any food left in the bottle after the child has finished eating should be thrown out, as milk warmed a second time is liable to be unwholesome. No child should be allowed to suck on an empty bottle or to sleep with the nipple in his mouth.

In the case of healthy babies weaning is a gradual process. By the twelfth month the child, whether fed from the breast or from the bottle, should be trained to drink from a cup. At that age the average child can digest undiluted milk and cereals, strained fruit juices and plain mutton or chicken broth. During the second year he gradually becomes accustomed to solid foods, and at eighteen months may be given potatoes, peas, beans, carrots and beets, if they are thoroughly cooked and finely mashed. He may also have eggs, toast, cooked fruit, such as baked apple or apple sauce, and roasted or broiled chicken, roast lamb or chops, broiled fish and roasted or broiled beef. The young child should not be given candy, soda water, tea, coffee or any alcoholic beverage, and he should not be permitted to eat ice cream until he is two years old. The number of bottle feedings has all this time been gradually decreasing, and at eighteen or twenty months the weaning is completed. Throughout the period of childhood the mother should see that the child has wholesome, nourishing food and is kept from eating rich desserts, stimulants, and an excessive amount of candy. Too many sweets injure both the teeth and the digestion.

Other Suggestions. To-day's babies are more comfortably dressed than those of a generation ago. The practice of swaddling the little creatures in many layers of elaborate clothing has been happily outlawed. A properly-dressed baby has his clothing made to hang from the shoulders, and his slips, dresses and wrappers are one-piece garments. Tight clothing interferes with the circulation, breathing and digestion and is decidedly uncomfortable. It is a mistake also to put too many and too heavy garments on the child; if he perspires freely in winter or summer he is

OUTLINE AND QUESTIONS ON THE BABY

Outline

I. The "Better-Babies" Movement

(1) History
  (a) Beginnings in France
  (b) Growth in America
(2) Baby conferences
  (a) Purpose
  (b) Method
  (c) Scoring
  (d) Measurements of the perfect child

II. The Right to Be Well-Born

(1) Eugenics
(2) Care of the mother—as to
  (a) Food
  (b) Bathing
  (c) Rest
  (d) Exercise
  (e) Clothing

III. Care of the Baby

(1) Keeping the baby clean
  (a) The bath
    1. Frequency
    2. Temperature
    3. Method
  (b) Care of the eyes (see BLINDNESS)
  (c) Care of the teeth
  (d) Care of the clothing
(2) Sleep
  (a) Amount needed
  (b) Harmfulness of "putting the baby to sleep"
  (c) Advantage of fresh air
    1. An out-of-door sleeping box
(3) Proper feeding
  (a) Decided advantage of breast-feeding
    1. Frequency of nursing
    2. Need for additional food
  (b) Artificial feeding
    1. Certified milk
    2. Modifying milk
    3. Necessity for cleanliness
    4. Proper bottles
  (c) Weaning
    1. A gradual process
  (d) Proper food for the weaned child
(4) Clothing
  (a) Simplicity
  (b) Danger of too heavy clothing
(5) To be avoided
  (a) Over-stimulation
  (b) Kissing
  (c) Unsanitary toys

IV. Children's Diseases

(1) Chicken pox
(2) Cholera infantum
(3) Croup
(4) Diphtheria
(5) Infantile paralysis
(6) Measles
(7) Scarlet fever
(8) Whooping cough

Questions

How tall should a baby be at the age of one year? What should be the circumference of its head?

What is the science called which has to do with "better parents"?

What are the advantages of mother's milk over cow's milk for a baby?

How often should a baby be bathed? Is a "good rub down" at the end of the bath beneficial?

How has the theory regarding the necessity of children's diseases changed?

What is meant by "modifying" cow's milk, and why is it necessary?

How would you make an outdoor sleeping box for a baby?

What may an eighteen-months-old baby eat?

How often should a baby be fed?

What is the object of baby "conferences," and how are the babies scored?

How has the United States recognized officially the importance of the "better-babies" movement?

What is the safe and sensible way of putting a baby to sleep?

over-dressed. Prickly heat is evidence that an infant is dressed too warmly. For underwear, select that made of medium-weight silk and wool or cotton and wool. All-wool garments are irritating to the tender skin.

Babies should not be bounced about or frolicked with, rocked or jogged. During the first few months they will get sufficient exercise through crying and tossing their arms and legs about. The baby who is constantly played with and over-stimulated will develop into a nervous child. Babies should not be kissed indiscriminately, and never on the mouth. Many infectious diseases are communicated through kissing and careless exposure of the child. Mothers should refuse to believe that it is necessary for their children to have measles, mumps, whooping cough and other childhood ailments. Rather, they should see to it that the little ones are properly safeguarded. This care should extend to the child's playthings, from which should be excluded woolly animals and toys covered with poisonous paint. Baby has a tendency to put everything he grasps into his mouth, and he should not be allowed to play with unsanitary toys.

Better Babies Conferences

Baby conferences have become popular features in numerous localities; they are usually conducted under the auspices of woman's clubs, health boards, infant-welfare societies, parent-teacher associations, civic clubs and similar organizations. The purpose of these conferences is to arouse interest in the hygienic and intelligent care of children. They are educational rather than competitive, though the custom of awarding prizes adds zest to the occasion.

The children are examined and scored by competent physicians exactly as cattle, horses and hogs are appraised by stock judges. In every case a standard is established, and each child is measured according to that standard. A typical score card would contain the following points, each of which is marked on the scale of 100: height; weight; circumference of chest; circumference of abdomen; symmetry; quality of skin and fat; quality of muscles, hand grasp, rising, sitting, poise, walking, running; bones of skull, spine, chest, limbs and feet; length of head, width and circumference; pupillary distance and shape of eyes; shape, size and position of ears; shape and size of lips; shape and size of forehead; shape of nose; shape and condition of jaw, hard palate and nostrils; number, shape, size and condition of teeth; disposition; energy; facial and ocular expression; attention. Beauty of face or body is not considered, but physical and mental development; a high-grade child, however, well-nourished, clean and firm of flesh, cannot be anything but wholesome and attractive.

The perfect child has the following measurements (one pound less being counted for girls):

Average weight, height and circumference of head and chest (for boys):

At birth—Weight, 7½ pounds; height, 20½ inches; chest, 13½ inches; head, 14 inches.

One year—Weight, 21 pounds; height, 29 inches; chest, 18 inches; head, 18 inches.

Two years—Weight, 26½ pounds; height, 32½ inches; chest, 19 inches; head, 19 inches.

Three years—Weight, 31 pounds; height, 35 inches; chest, 20 inches; head, 19¼ inches.

Teeth—Central incisors appear about the seventh month; lateral incisors from eighth to tenth; anterior molars, twelfth to eighteenth; eye and stomach, fourteenth to twentieth; posterior molars, eighteenth to thirty-sixth.

The child should make the first attempt to sit up at about the sixteenth week, be able to do so at about the fortieth, and be firmly seated at the end of the tenth or eleventh month.

The first attempt to stand should be made about the thirty-eighth week. The fourteenth or fifteenth month is the average period for walking. A child who cannot walk by the eighteenth month is backward in that respect.

The flesh should be firm, the skin pink, the lips red, the tongue uncoated and the breath sweet. Breathing should be done through the nose. The child should not be fretful, nervous or disinclined to play.

The normal child can say words like *mamma, kitty, down,* etc., by the end of eighteen months. By the end of the second year it is able to join words into short sentences.

Baby conferences have been productive of so much good that they are being encouraged by such an authoritative body as the American Medical Association (535 N. Dearborn St., Chicago). By applying to the Secretary of the Council on Health and Public Instruction at this address, full instructions for holding conferences, together with score cards and other material, can be obtained. Explanatory material and score cards are also distributed by the Better Babies Bureau of the *Woman's Home Companion,* New York, and by health authorities of many cities. H.F.H.

Consult Holt's *Care and Feeding of Children;* Forsyth's *Children in Health and Disease;* Oppenheim's *The Nervous System and the Child.* The above books are recommended to mothers by the American Medical Association.

Related Subjects. The reader who is interested in this topic will find much that is helpful in the following articles:

Blindness	Fly
Chicken Pox	Health Habits
Child	Infantile Paralysis
Cholera, subhead	Infant Mortality
Cholera Infantum	Measles
Croup	Milk
Diphtheria	Scarlet Fever
Eugenics	Whooping Cough

BABYLON, *bab'ilon,* a city of the ancient world, the capital of Babylonia, situated on the left bank of the Euphrates River, about seventy miles south of Bagdad. Babylon, whose name is the Greek form of a word meaning *gate of the Gods,* is first known to history more than 5,000 years ago as the city of Sargon of Akkad (about 3800 B. C.). As the capital of all Babylonia in 2094 B. C., it was the prey of numerous Assyrian kings until 689 B. C., when it was destroyed by Sennacherib. It was rebuilt by his successor, Esarhaddon, and then under Nebuchadnezzar (604-561 B. C.) became one of the wonders of the ancient world, its walls of immense height and thickness enclosing magnificent buildings and pleasure grounds. The celebrated Hanging Gardens (see HANGING GARDENS OF BABYLON) and the great temple of Belus are among the world's greatest achievements.

The city under Nebuchadnezzar was built in the form of a square, the area of which modern scholars give as twelve square miles. Cyrus the Great seized the city in 538 B. C., and with this conquest it became a part of the Persian empire. Under the Persian monarchs the once famous city began a rapid decline, and when Alexander the Great entered it he found it falling into ruins.

The history of Babylon ends practically in 275 B. C., when the remaining inhabitants were taken to the newly-founded city of Selucia. Modern excavations, begun in 1899, have brought to light many art treasures and inscriptions that reveal interesting facts about the city which Nebuchadnezzar called "Babylon the Great"; but little has been found which throws light on the earlier periods of its history. See BABYLONIA.

BABYLONIA, *bab i lo'ni a,* the ancient southern portion of the Tigris-Euphrates Valley, the seat of a mighty empire, the earliest in the history of mankind. This land, after centuries of varying fortune, became a part of the Turkish Empire, and now is included in the modern Irak-Arabi, which contains parts of the divisions known as Bagdad and Basra.

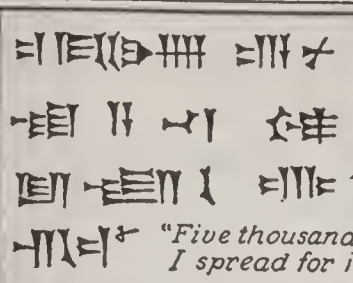
Geography. Babylonia was a plain lying south of Assyria and Susiana, and stretching southward to the Persian Gulf. Westward, it merged with the Arabian Desert; along the eastern border flowed the River Tigris. At various times its rule extended westward to the sea. The name Babylonia comes from Babylon, the ancient capital of the district, and the latter term is used in the Old Testament to mean the country as a whole. Akkad, or Accad, and Shumar, or Shinar, were applied in early times to the northern and southern divisions.

Like the Valley of the Nile, the Babylonian plain was enriched by the deposits of rivers, and so fertile was the land that tradition made this region the scene of the Garden of Eden, "out of the ground of which God made to grow every tree that is pleasant to the sight and good for food" (*Genesis* II, 9). In ancient times Babylonia was covered by a network of dikes and canals, the ruins of which may still be seen in the present cheerless waste of country.

People. It is supposed that the Babylonians were a union of the Semitic and non-Semitic races, the latter being the first inhabitants of the country, and the former a people who came there from Arabia. They were an industrious and peace-loving people, and became wonderful farmers and traders. Their harvests of grain excited the amazement of the Greek historian Herodotus. Across the Arabian Desert came caravans laden with precious stones, spices, copper and gold; from the East they received marble and precious metals, and the kings bought cedar-wood obtained from the Syrian mountains to adorn their temples and palaces. Babylonian traders traveled to far-distant lands with native products, thus putting the ancient world in contact with Babylonian civilization.

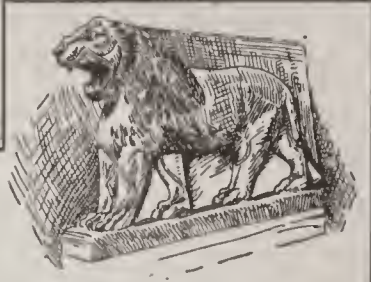
Their language was much like that of the Hebrews and Phoenicians, and was written in the form of wedge-shaped characters, to which the name *cuneiform* has been given (see CUNEIFORM INSCRIPTIONS). For writing materials they used clay and stone tablets, especially the former. Babylonian literature included many different subjects—hymns, prayers to the gods, poetry, myths, history, science, agriculture and law. The Babylonians were ruled by kings who had absolute power; under the king were officers called *viceroys,* who governed the provinces. They had a religion of many gods, and each important city was the center of the worship of a particular god.

BABYLONIA



"Five thousand mighty cedars
I spread for its roof."

Cuneiform writing, and translation



Lion from Nimrud

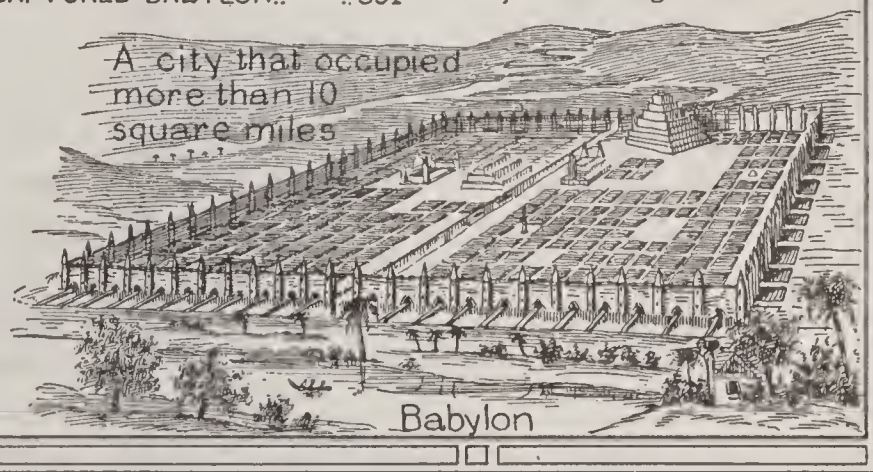
The famous Hanging Gardens
Built to please a woman

Present-day site of Babylon

PRINCIPAL DATES	B.C.
NIMROD FOUNDED BABYLON ABOUT	2300
RISE OF ASSYRIA	1250
ERA OF NABONASSAR	747
FALL OF NINEVEH	625
CYRUS CAPTURED BABYLON	538
ALEXANDER CAPTURED BABYLON	331

Babylonia at its greatest extent

Bas-relief of warriors in battle



Babylon

They also believed that the earth was peopled by good and evil spirits who could aid or harm men.

Art. The Babylonians were the first people to practice architecture as a fine art. As the country produced no stone, they were forced to use sun-dried clay bricks as a building material. To give their temples and palaces a firm foundation and also to lend them dignity, they erected them on great brick platforms, sometimes forty feet above the plain. Their palaces were one-story structures having many rooms, courts and passages, thick, vertical walls and flat roofs. The temples were sometimes one story high, but oftener were a type peculiar to Babylonia—a series of solid masses of brick placed one above the other, with each story smaller than the one beneath it. The plainness of these buildings was relieved by covering the bricks with stucco, upon which designs were painted. The Babylonians made great progress in sculpture and engraving, and their alabaster and terra-cotta vases, copper and bronze statuettes, glazed tiles and seals and gems showed their ability in the minor arts.

History. The history of Babylonia, like that of Assyria, begins in obscurity, and the two districts were so closely connected that historians find it impossible to treat them separately. The first line of kings of whom there is a clear record ruled about 4500 B.C. The first great name in Babylonian history is that of King Hammurabi (about 2100 B.C.), founder of the "Old Babylonian Empire," who chose Babylon as the seat of government, and who made the oldest code of laws known to man. For over five centuries after 1761 B.C. Babylonia was ruled by Kassites, a people from Media, but a native king sat on the throne in 1185 B.C. In the meantime there had been centuries of warfare with Assyria; and Babylonia, reduced to an Assyrian province in the eighth century, was completely conquered in 689 B.C. by Sennacherib, the impious destroyer of Babylon. A century later the Babylonians, aided by a horde of Medes under Cyaxares, revolted, and captured and destroyed the Assyrian city of Nineveh. A new Babylonian kingdom was set up, which grew to be a great empire under Nebuchadnezzar (which see). This is known in history as the "New Babylonian Empire." A line of weak kings followed Nebuchadnezzar, and in 538 B.C. Babylon was

Outline and Questions on Babylonia

I. The Country

(1) Location, in Tigris-Euphrates Valley
(2) Fertility of the soil
  (a) Agriculture

II. The People

(1) Origin
(2) Characteristics
(3) Language and literature
  (a) Cuneiform inscriptions
(4) Commercial ventures
(5) Art
  (a) Architecture
  (b) Sculpture
  (c) Minor arts
(6) Religion
(7) Government

III. History

(1) The Old Empire
(2) Assyrian supremacy
(3) Capture of Nineveh
(4) The New Empire
(5) Later subject condition

Questions

Is there a Babylonia to-day?

Was ancient Babylonia an isolated nation, or did it have intercourse with other countries?

Who drew up the earliest known code of laws?

How did the empire rank among others in point of age?

Why was this valley made the traditional site of the Garden of Eden?

What art originated with the Babylonians?

What other names did the country bear?

Wherein did the religion of the Babylonians differ decidedly from that of the Hebrews?

Were they naturally a warlike people?

To what nations were they subjected during the course of the centuries?

What is there to show that the people employed irrigation?

Describe a typical Babylonian temple.

What sort of writing material was employed?

What were the written characters called, and what other nation used them?

Who was Nebuchadnezzar, and how was he punished for his pride?

captured by Cyrus the Great of Persia. Thereafter Babylonia was a Persian province until, with the Conquest of Alexander the Great, it passed under Greek control and then into the hands of the Parthians. Under the Parthians all that remained of Babylonian culture was lost, and in A.D. 1000 the country was given over to the Bedouins and Arabs. See ASSYRIA; BABYLON; SENNACHERIB. B.M.W.

Consult Hilprecht's *Explorations in Bible Lands;* Sayce's *Ancient Empires.*

BACCHUS, *bak' kus,* (in Greek, DIONYSUS), in classic mythology the god of wine, was the son of Jupiter and Semele. In early times he was connected with the springing up of plant life, and he taught how to cultivate the vine and how to make the wine from the fruit. Great feasts, known as *Bacchanalia,* or *Dionysia,* were held at Athens in his honor. These were introduced into Rome in the second century B.C., but they became so debasing that they were forbidden in 186 B.C. by the Roman Senate. In art the forehead of the god is crowned with vine leaves or ivy, and he is represented as naked, or wearing a wide mantle about his shoulders and a faun skin across his breast.

Bacchus, that first from out
the purple grape
Crushed the sweet poison of
misused wine.
—From Milton's *Comus.*

Bacchantes. The worshipers of Bacchus, both men and women, were called Bacchantes. These people, at the time of the feast of Bacchus, would gather on the woody heights, and, roused to frenzy by wine and excitement, spend days and nights in dancing and rioting. In modern speech, *bacchantic* is applied to riotous or drunken revels.

BACH, *bahK,* JOHANN SEBASTIAN (1685-1750), the first of the great German musicians, unequaled as a composer of organ and choral

music, and called the "master of masters" because his works inspired so many of the famous musicians who followed him—among them Mozart, Beethoven, Mendelssohn, Schumann, Chopin, Liszt, Rubinstein and Wagner. Bach came of a family distinguished in music for many generations, and he was trained in the art from early childhood. He secured his first paying position, that of violinist at the court at Weimar, when he was eighteen, and afterwards held several organ and choir positions until 1723, when he became music director in the two principal churches at Leipzig, where he remained until his death.

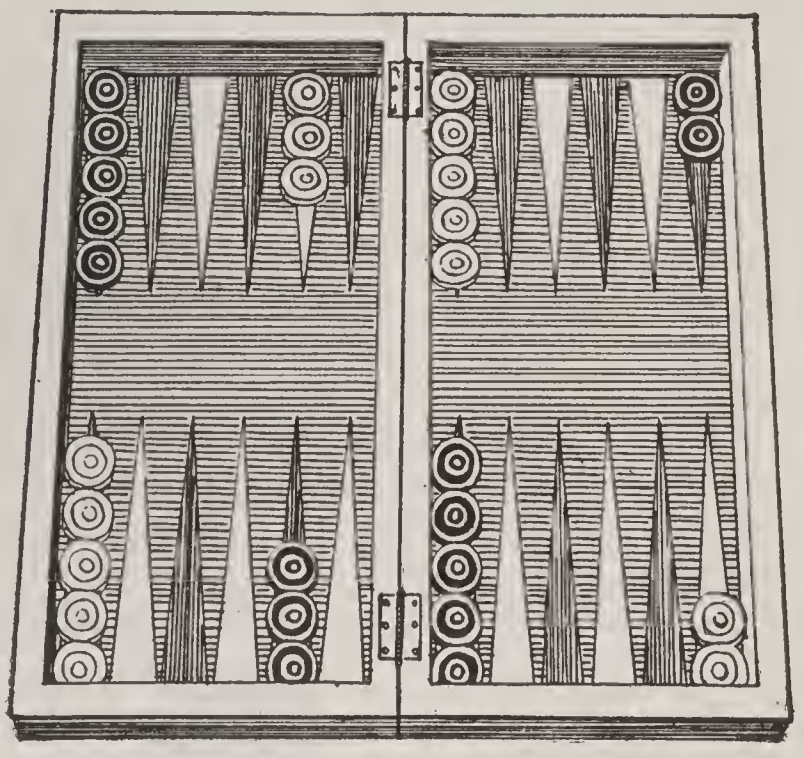
Bach composed for the organ, piano, stringed instruments, and the human voice. His vocal works, including passion music, oratorios, masses and cantatas, are masterpieces, and his *Saint Matthew Passion, Mass in B Minor* and *Saint John Passion* are the greatest choral pieces ever written. His *Contest of Phoebus and Pan* is a famous cantata, and well-known oratorios are those for Easter and Christmas. Bach was the greatest organist of his time, and his preludes and fugues for the organ are the most perfect ever composed. *The Well-tempered Clavichord* is a book of instruction of great value. He also brought out a new system of fingering, which has had great influence on modern piano playing. Bach was married twice, and eleven of his twenty children were musicians.

BACHELLER, *batch' el er,* IRVING (1859-), an American novelist, born at Pierpont, N. Y., in a house overlooking Paradise Valley, the scene of the first part of his *Eben Holden,* the most widely-read of his books. He was graduated at Saint Lawrence University, Canton, N. Y., wrote for several New York papers, and before *Eben Holden* appeared in 1900 he had published two novels and conducted a bureau for supplying magazines with literary material. Urged by a friend to put more of human interest into his stories, he wrote three novels of the North Adirondack region that established his fame, the one mentioned above, and *Dri and I* and *Darrel of the Blessed Isles.* All of these are natural and simple in style, and enlivened by quaint humor and homely philosophy. *Charge It* and *Keeping up with Lizzie* ridicule modern habits of spending money. *A Man for the Ages* (1921) is a story woven around the immortal Lincoln.

BACHELOR'S BUTTON, a name shared by several plants whose flower heads resemble buttons, notably the bright yellow, double buttercup, the blue cornflower, known in Germany as the *Kaiserblume,* and the purple globe amaranth. The children prefer to believe the story that bachelor's buttons are so-called because they were once carried about by young bachelors who were in love. A quick fading of the flower was a sign that their affection was not returned, but if the flower kept its freshness, they knew their affairs of the heart would prosper. See KAISERBLUME.

BACILLUS, *ba sil' us.* See BACTERIA AND BACTERIOLOGY.

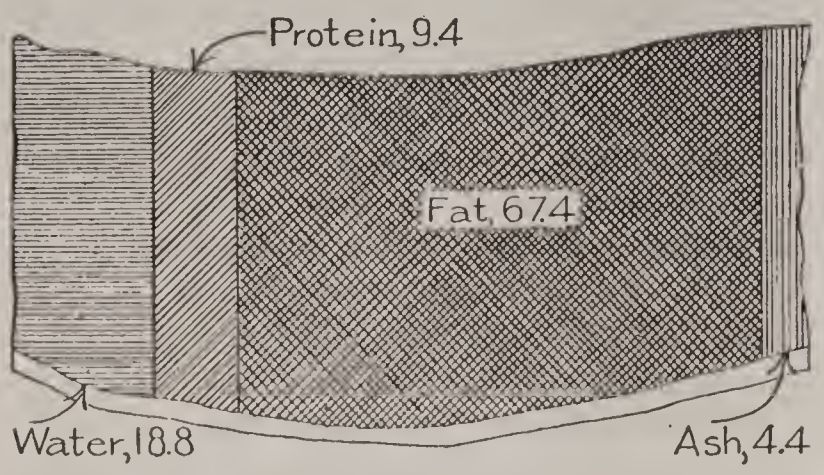
BACKGAMMON, *bak' gam un,* a game of very ancient origin, the name being usually considered a contraction of a Welsh word meaning *little battle.* It is played by two people upon a double table containing twenty-four spear-shaped divisions called *points,* divided into four sections of six points. Each player takes 15 men, or checkers, which are placed on the table in the manner shown in the illustration. A player then makes a throw with two dice. The score of the dice indicates the point to which a checker may be moved, the points nearest to each player being numbered from 1 to 12. The object of the game is to move all the checkers from point to point round the table on to the fourth section of 6 points. From there they are removed in numbers according to the score of the dice thrown. The player first removing all his checkers is the winner.



BACKGAMMON BOARD

BACON, *bay' k'n,* the flesh of the hog, specially prepared by salting and smoking. The best quality is made from the sides and back, though other portions of the carcass supply bacon of inferior grade. The flesh is first cured

by being saturated in a solution of salt, or a mixture of salt and sugar, and it is then smoked by being suspended over a wood fire. In cook-



FOOD VALUE OF BACON

ing it is usually cut into very thin slices and fried, or it may be boiled in larger pieces. Because of its delicate flavor, bacon is a favorite dish in all civilized countries. It is largely composed (60 per cent) of carbon compounds and because of its heat producing quality as well as its flavor, is a part of the regular bill of fare in cold countries, especially in the lumber camps of the United States and Canada. Its value as a builder of bone and muscle is about half that of good fresh beef. See Food and its subtitles.

BACON, Francis (1561-1626), an English philosopher, statesman and jurist, whose *Essays* also rank him among the greatest of the world's writers. He was born of good family, studied at Cambridge, and finished his education with foreign travel. That he was a born courtier is shown by his reply to Queen Elizabeth, who when he was but a boy asked him his age. Bowing low he replied, "Two years younger than your majesty's happy reign."

If parts allure thee, think how Bacon shin'd,
The wisest, brightest, meanest of mankind.
—From Pope's *Essay on Man.*

Admitted to the bar when but twenty-one, he made an immediate reputation, and two years later entered Parliament. In 1618 he was created lord high chancellor, and in 1621 was raised to the peerage as Viscount of Saint Albans. He was accused of corruption as a judge and on pleading guilty to the charge, was heavily fined and sentenced to the Tower during the king's pleasure. Subsequently his punishment was practically remitted, though not till he had suffered the full measure of disgrace.

Bacon's chief title to renown is in his development of the inductive method of reasoning (see Logic). He undertook to rearrange the whole system of human knowledge, and though his task was too great for him, he contributed more to real scientific progress than any other man since the days of the Greek philosophers. The illness of which he died was contracted while he was making an experiment with snow, the success of which led to the cold storage systems of to-day. His *Essays,* fifty-eight in number, treating of a great variety of subjects, are as bright, as fresh, as applicable to life, as when they were written. They are so full of meaning, so condensed in style and so logical in arrangement, that they repay the closest study. Some of these are generally included among college entrance requirements in English. The one most read by young people, and probably more appropriate for them than any of the others, is *Of Studies.* It is printed in full in the article Essay. C.W.K.

BACON, Josephine Dodge Daskam (1876-), an American story-writer whose humor, original ideas and brilliant style have won for her a wide reputation. She was born at Stanford, Conn., educated at Smith College, and began her literary work by writing poems and stories for the *Atlantic Monthly* and other magazines. An early success was *The Madness of Philip,* which points out, in a humorous way, the supposed faults of certain kindergarten methods. Her writings include *Smith College Stories, The Imp and the Angel, In the Border Country, Memoirs of a Baby, The Luck o' Lady Joan* and *The Open Market.* She also compiled *Best Nonsense Verse.* Miss Daskam married Seldon Bacon in 1903.

BACON, Roger (1214-1294), an English monk and philosopher, one of the great men of the thirteenth century. He raised himself far above his age and added much to what was then known of science and nature. Bacon attended the universities of Oxford and Paris, receiving at the latter the degree of Doctor of Theology. About the year 1250 he joined the Franciscan Order and settled at Oxford, where he began a deep study of physics. Having announced his discoveries in that science, he was accused by his fellow Franciscans of dealing in the "black art," the devil's magic, and was removed to Paris, where he remained for ten years in

prison, without books or instruments. Though free from persecution for the next ten years, he was imprisoned a second time in 1278, through the ill-will of the head of the Franciscan Order. About 1288 he was permitted to return to Oxford, where he remained until his death.

Bacon held some of the incorrect ideas of his own time, but deserves honor for the new knowledge he gave the world on the subject of light and vision, for several discoveries in chemistry, for pointing out the errors in the calendar, and for establishing scientific method in the investigation of all objects and phenomena. A copy of the corrected calendar which he made in 1263 is now in the library of University College, Oxford. His most important writing is the *Opus Majus* (Great Work), an encyclopedia of the different sciences.

BACON'S REBELLION, an uprising of the Virginia colonists, occurring in 1676 and directed against the mismanagement of affairs by Governor Berkeley. It was headed by NATHANIEL BACON, a young planter who had settled in Virginia in 1673. He soon became a member of the governor's council, and won the affection and trust of the colonists by his kindly manners. With his fellow colonists he had been bitterly dissatisfied with the policy of the home government and of Governor Berkeley, their chief causes for complaint being unequal taxation, the payment of unjust tobacco duties and unfairness in the voting system.

This discontent became open rebellion when the governor refused to protect the people from outbreaks of the Indians. When his plantation on the site of the present city of Richmond had been attacked, Bacon asked the governor to permit him to head a band of troops against the Indians. When Berkeley refused, Bacon led out a company without that officer's consent. Some fighting took place and Jamestown was burned, but the sudden death of Bacon put an end to the rebellion. Berkeley executed a number of the leaders in the affair. Though nothing was gained, the uprising showed the courageous spirit of the Virginia colonists.

BACTERIA, *bak te' ri a,* **AND BACTERIOLOGY.** Bacteria are the most minute organisms known to man. The name is derived from a Greek word, *baktron,* meaning *a little staff* or *stick.* The first bacteria discovered really looked like rods, but many of them are now known to be round, oval and of various other shapes. They are found everywhere, in the food we eat, in the water we drink, in the air we breathe and growing in our bodies. It is due to bacteria that milk sours, butter becomes rancid and meat becomes "gamey," or even spoils. The phosphorescence of sea water is often caused by bacteria.

BACTERIA, VERY MUCH ENLARGED

(*a*) Tetanus (lockjaw) bacilli.; (*b*) anthrax bacilli; (*c*) diphtheria bacilli; (*d*) tuberculosis bacilli; (*e*) malarial fever parasites, in black; the corpuscles are red; (*f*) typhoid bacilli.

General Characteristics. Bacteria are vegetable organisms, and they can be distinguished only when examined through a microscope. It has been estimated that 1,500 of the rod-shaped kind, placed end to end, would just reach across the head of an ordinary pin. A single bacterium, so we are told, weighs no more than three-two-hundredth billionths of a grain. Many bacteria are able to move about by using their *flagella,* which resemble hairs. These *flagella* project from the body and can be whipped back and forth to drive the bacteria through any liquid. This peculiarity first led scientists to suppose that bacteria were animals, but it is now understood that they are tiny plants.

According to their shapes, bacteria are divided into three classes: (1) the *bacillus* (plural, *bacilli*) is rod-shaped; (2) the *spirillum* (plural, *spirilla*) is longer than the bacillus, but is curved or spiral; (3) the *micrococcus* (plural, *micrococci*) is more or less spherical. Each of these classes shows many varieties. Bacilli, for example, may be found singly, in pairs, or in long strings. Spirilla may look like commas, or they may be long, thin spirals or short thick ones. If micrococci are arranged in rows like strings of beads they are called *streptococci.*

Each kind reproduces its kind. Typhoid fever and tuberculosis are caused by bacilli; Asiatic cholera by spirilla; and pneumonia by micrococci (*pneumococci*).

Kinds of Bacteria. It is because bacteria growing in our bodies result in many diseases that people now hear so much about bacteria. There are really two kinds. One kind or group feeds on dead animal or vegetable matter, the other kind only on living matter. Bacteria of the second class (see PARASITES) are the more harmful. Although the former may be malignant, they are doing good in that they are destroying dead matter and decomposing it into its elements. But bacteria which live on living things destroy other lives to nourish their own; they are doing harm. Nearly all infectious diseases are known to be caused by bacteria. The few, including measles and scarlet fever, not known to be caused by bacteria, are believed to be caused by them, but the specific germ in each case has not yet been discovered. This is probably due to the fact that the germs in question are too small to be seen even under a powerful microscope. See DISEASE, subhead *Germ Theory of Disease.*

How to Kill Bacteria. Strong sunlight is a powerful germ killer, provided it acts long enough. Its power is lessened when it passes through glass; it is therefore best to sun things out-of-doors. Freezing and drying are uncertain methods of killing bacteria, for the organisms supposedly dead may be only lying quiet in their latent form. Heat, especially moist heat, is a sure way to destroy germs. Boiling milk or water or cooking meats and vegetables always destroys these harmful organisms and prevents any possible infection. This is the reason why health authorities should always warn people to boil their drinking water if the source of supply has been infected in some way. As a rule, milk which has been carefully handled from the start need not be boiled so long that its character and taste are affected, as ordinary germs are destroyed with moderate heat. Long-continued boiling, however, which greatly changes both its taste and nutritive qualities, is the only sure way of rendering milk absolutely sterile. Certain so-called germicides or disinfectants, such as alcohol and carbolic acid, also put an end to germs, but many advertised proprietary germicides are worthless. See ANTISEPTIC; ANTITOXIN.

Bacteriology. Bacteriology is the study of the character, development and effects of bacterial growth, with especial reference to human

Outline and Questions on Bacteria and Bacteriology

I. Characteristics

(1) Vegetable organisms
(2) Size
(3) Flagella
(4) Classes
  (a) Bacillus; rod-shaped
    1. The germ of typhoid fever and tuberculosis
  (b) Spirillum; long, curved or spiral
    1. The germ of Asiatic cholera
  (c) Micrococcus; spherical
    1. The germ of pneumonia
(5) Where found

II. Kinds of Bacteria

(1) Those feeding upon dead animal or vegetable matter
(2) Those feeding upon living matter
  (a) Germs of most infectious diseases

III. The Destruction of Bacteria

(1) By strong sunlight
(2) By moist heat
(3) By disinfectants

IV. Bacteriology

(1) The study of bacteria causing human diseases
(2) Methods of studying these organisms
(3) Means of getting a "pure culture"
(4) Ways of determining the kind of germ

Questions

What do the bacteria that cause typhoid fever look like?

Why does not milk taste the same after it has stood for several days?

Can all kinds of bacteria be grown in the same substance?

What characteristics led scientists to suppose at first that bacteria were animal organisms?

Do different kinds live together in a single colony?

What advantage has the back yard over the sun-parlor as a place for sunning things?

Can any physician tell what the germs of scarlet fever and measles look like?

How are bacteria specimens mounted for study?

What method may be used to render milk perfectly sterile?

diseases caused by them. When bacteria are to be studied they may be placed in a flask containing some nourishing substance, which must be absolutely free from germs. The different kinds of bacteria flourish on different substances—for example, blood, potatoes, gelatin and bouillon—and the material must be chosen for the bacteria under consideration.

After this nourishing material or medium is prepared, and before the bacteria are inserted, it must be sterilized. This is usually done by exposing it to live steam for half an hour or more on several days in succession. When the medium is finally ready the bacteria are placed in the flask, which is then slowly heated until the growth of the bacteria becomes evident. The medium is then allowed to cool, and, if it has been properly prepared, will harden quickly. The bacteria are then held motionless in the cold gelatin, or .whatever the medium may be. Minute specks of bacteria will be seen on the surface of the gelatin. Each speck is a colony of bacteria, and each colony includes only bacteria of a single species. By transferring one of these colonies to another medium, it is possible to raise additional colonies of these bacteria indefinitely. These specks or colonies are usually so tiny that it is impossible at first to transfer one and only one. After several such transfers the bacteriologist succeeds in getting a growth which is free from all life except the bacteria of a single species. This growth is a "pure culture."

So minute are many bacteria that no microscope is powerful enough to show differences between them. They all have peculiarities of development, however, which can be studied in pure cultures. For study with microscopes bacteria are usually placed on a glass slide and covered with a piece of thin glass. Some bacteria are stained, for experiment or for purposes of diagnosis, to bring out their peculiarities; the tuberculosis germs, for example, can be recognized only by their reaction to certain stains. These germs are determined in the following manner: A suspected specimen is stained with a strong solution of a red dye called fuchsin, to which carbolic acid has been added. After staining, the specimen is washed in dilute acid, by means of which the stain is extracted from all other bacteria. Notwithstanding the action of the acid, the tuberculosis bacilli retain the red stain, and are thus differentiated. W.A.E.

Consult Muir and Ritchie's *Manual of Bacteriology;* Ball's *Essentials of Bacteriology*

BADEN, *bah' den,* a town in Austria, fifteen miles southwest of Vienna, especially noted for its hot, sulphurous springs. It is visited by more than 20,000 people annually for the sake of its waters, which are believed to have a beneficial effect in cases of rheumatism, gout and kidney and skin diseases. Many mansions are maintained there by the Austrian nobility, among them being the imperial palace of Weilberg. Its chief industry besides caring for its visitors is the manufacture of small steel tools. To distinguish it from other cities of the same name it is generally called *Baden Bei Wien,* meaning Baden near Vienna. Population in 1920, 14,000.

BADEN, a famous watering-place at the edge of the Black Forest of Germany, in the Grand Duchy of Baden. It is often called *Baden-Baden,* to distinguish it from other places of the same name, of which there are many, for the word means *baths.* From the mineral springs of the town flows water with a temperature which ranges from 117° to 154°, famed from very early times. In normal times more than 70,000 people flock to Baden each year seeking relief from gout, rheumatism or diseases of the skin or kidneys, but the resident population of the town is only 22,000.

There are a number of attractive buildings, including the grand duke's summer residence and an old castle. The city is arranged in the form of an amphitheater. Aside from caring for visitors, its principle industry is woodcarving.

BADEN, a former grand duchy of the German Empire, on the east bank of the Rhine, touching Lake Constance and bordered by Switzerland on the south and Alsace on the

THE FORMER GRAND DUCHY

west. In size it was the fourth state, and in population the fifth state, in the Empire. Its

area of 5,817 square miles is slightly less than the area of Rhode Island and Connecticut; its population was 2,208,503 (1919). It is traversed by the lofty plateau of the Black Forest. Coal, iron, zinc, nickel and copper are mined in many places, and the fertile soil yields abundant crops of wheat, barley, corn, potatoes, flax, hemp, beetroot and tobacco. Grapes are extensively cultivated, and Baden is noted for its light wines.

The chief manufactures are textiles, tobacco, chemicals, machinery, jewels, pottery, musical instruments, wooden carvings and toys. The capital is Karlsruhe, with a population of 135,952; other important towns are Mannheim (229,576), Freiburg (87,946), Constance (24,818), and Heidelberg (69,806), the seat of the oldest university of the German Empire. The mineral springs of Baden are famous throughout the world (see BADEN).

The duchy was governed by an hereditary grand duke, assisted by two chambers comprising a Parliament, or *Landtag*. Every citizen of legal age, not a pauper and not convicted of crime, had a vote. The lower chamber consisted of seventy-three members; the upper is composed of all adult male members of the reigning family, the archbishop of Freiburg, burgomasters of small towns, representatives of the chamber of commerce and eight members who were elected for four years by the nobility. Baden became part of the German Empire in 1871. In 1919 it was impossible to forecast the future form of government of Baden, for the old Empire had entirely disappeared, and a new order had not been established.

BADEN-POWELL, ROBERT STEVENSON SMITH (1857-), a British general who acquired distinction through a brilliant military career, but is known in the United States and Canada chiefly through his keen interest in the Boy Scout movement. He entered the army in 1876 and served in India, Afghanistan and South Africa. He was distinguished as commander of the native troops in Ashantee in 1895, and later in the Mátabele campaign. During the South African War his force of 1,200 men was besieged for 215 days by a large Boer army at Mafeking, and despite famine and sickness he succeeded in repelling his assailants until he was relieved. Because of his success in defending the place he was promoted to the rank of major-general.

General Baden-Powell has always taken a keen interest in the welfare of boys, and his wide experience and ready understanding admirably qualify him as an ideal for, and leader of, boys of all ages. His works on scouting are authoritative and are widely read. See BOY SCOUTS.

BADGER, *baj' ur,* an animal belonging to the same family as the bears, weasels and skunks. It sleeps all day in a burrow and comes out to feed at night. It has short, thick legs, and powerful claws on its forefeet, with

BADGER

which it digs up roots and vegetables and also destroys the houses of ground squirrels, gophers and mice, which it eats. The badger is about the size of a large fox terrier, but its body is stouter and its legs are shorter. Its fur, of a grayish color, is valuable, and its long hairs are used for making artists' brushes and shaving brushes. Natives of India eat its flesh, but it is not considered fit for food in most countries. It will always seek safety in its burrow rather than fight, but when cornered and compelled to fight it is a formidable enemy.

"Badger baiting," or "drawing the badger" was a cruel sport formerly practiced in England and America. A badger was put into a barrel, and dogs were sent in to drag him out. When this was accomplished, the dogs were called off and the badger was put back into the barrel and attacked again. Several dogs might be killed or severely injured by the badger's powerful teeth before he could be got out of his barrel. From this "game," as it was called, we get the word *badgering,* which means *worrying.*

Wisconsin is called the Badger State, because it is the principal American home of these animals.

BAD LANDS, a name applied in the United States to certain lands which have been greatly eroded by rain and floods (see EROSION). The most striking example of such erosive action is found in the upper drainage basin of the Missouri River, near the Black Hills. There the soil is not protected by vegetation. It is composed of sand, gravel and horizontal strata of clay and limestone, and the hills are easily washed by rain into fantastic gullies. The term is a literal translation of *Terres*

Mauvaises, the name first given to these regions by Canadian trappers.

There is in the minds of some people a belief that the vicinity was so named because of the wild and vicious character of some of the early miners, hunters, and adventurers. This is untrue; but the Sioux Indians, in their wars against the United States, found natural fortresses in the hills and valleys, and thus made more stubborn their resistance to authority; this fact probably emphasized the error above noted.

The section is noted for the great variety of fossil remains found there (see FOSSIL).

BAEDEKER, *bed′ e ker,* KARL (1801-1859), a German publisher born in Essen, whose travelers' handbooks, called *Baedekers,* for the use of European tourists have become famous the world over. He began as a bookseller of Coblenz in 1827, and twelve years later issued the first of his series of travel-books, these being devoted to Belgium and Holland. The collection now includes all the European countries and portions of North America and the Orient. Each volume is provided with good maps and the books are always accurate to the date of publication. Since 1872 the firm has had its central offices in Leipzig.

BAFFIN LAND AND BAFFIN BAY, an island and bay in the Arctic regions to the west of Greenland, named after the English navigator, William Baffin. The area of the island is not accurately known, but it is estimated at about 236,000 square miles, making it the fourth largest island in the world, yet it is one of the least valuable. It is inhabited by a few Eskimos and is barren and inhospitable. In 1911 Bernard Hantzsch, who had spent a year in its exploration, died there, after completing the most reliable maps and surveys yet obtained.

Baffin Bay, separating the island from Greenland, is about 800 miles long, with an average breadth of 280 miles, and was first explored by Baffin in 1615. The bay is seldom free from ice, though open for a short time during the hottest time of the year. On the shores, which are high and rocky, are a few Eskimo and Danish settlements. The black whale, walrus and seal are found in the bay; and bears, foxes and hares are numerous in the surrounding territory.

William Baffin, the English navigator and explorer, was born about 1584. Having a fondness for the sea, he visited Greenland in 1612, again in 1615, and also made voyages to Spitzbergen in 1613 and 1614, all before he was thirty years old. After his Arctic explorations

BAFFIN LAND AND BAFFIN BAY

he entered the service of the East India Company, and in 1622 was killed while leading an expedition to drive the Portuguese out of Ormuz, in the Persian Gulf.

BAGATELLE, *bag a tel′,* an indoor game, supposed to have originated in Italy, played with spherical balls and a cue similar to that used in billiards, on a cloth-covered table about eight feet long and two feet wide. At one end of the table are nine holes, or cups, numbered from one to nine, in size just sufficient to receive the balls, of which there are nine, one black and eight white or red. The black ball is placed on a spot in front of the cups. From the other end of the table the player strikes a ball, playing at the black ball, which he must hit before he can score. Any ball going into a cup scores the number of the cup, the black ball being counted as double. Whoever makes the highest total after playing the eight balls is the winner.

BAG′DAD, the capital of a former Turkish province, now under British control, was once one of the most beautiful and greatest cities in the world, the capital of the caliphs and the center of Arabian culture and learning, famous in literature as the scene of the *Arabian Nights Entertainment.* The River Tigris, flowing through the city, separates the old town,

on the west, from the new and larger part, on the east bank. For the most part the city is squalid and dirty, with winding, narrow streets and many ruins as reminders of its former glory. The typical Turkish houses, without windows on the street side, are also uninviting and suggestive of gloom, but the interior courtyards are often richly decorated and ornamented with gardens and fountains. There are many mosques, some partly in ruins, and a number of famous bazars, or markets, but with the exception of the Governor-General's palace and the citadel there are no public buildings of importance. The population, which is estimated at 150,000 to 225,000, is composed mostly of Arabs, Turks, Armenians, Persians and Jews, with a few Christians.

Bagdad carries on a considerable trade in leather, silks, carpets and ornamental fabrics, and previous to the opening of the Suez Canal in 1869 was one of the chief centers of trade on the caravan route to India. Peace in Europe

BAGDAD AND ITS RAILWAY

This line was a part of Germany's long-cherished plan to secure rail connection between Berlin and the Persian Gulf. Its hopes for supremacy in Southwestern Asia would thus be advanced. British victories defeated this ambition.

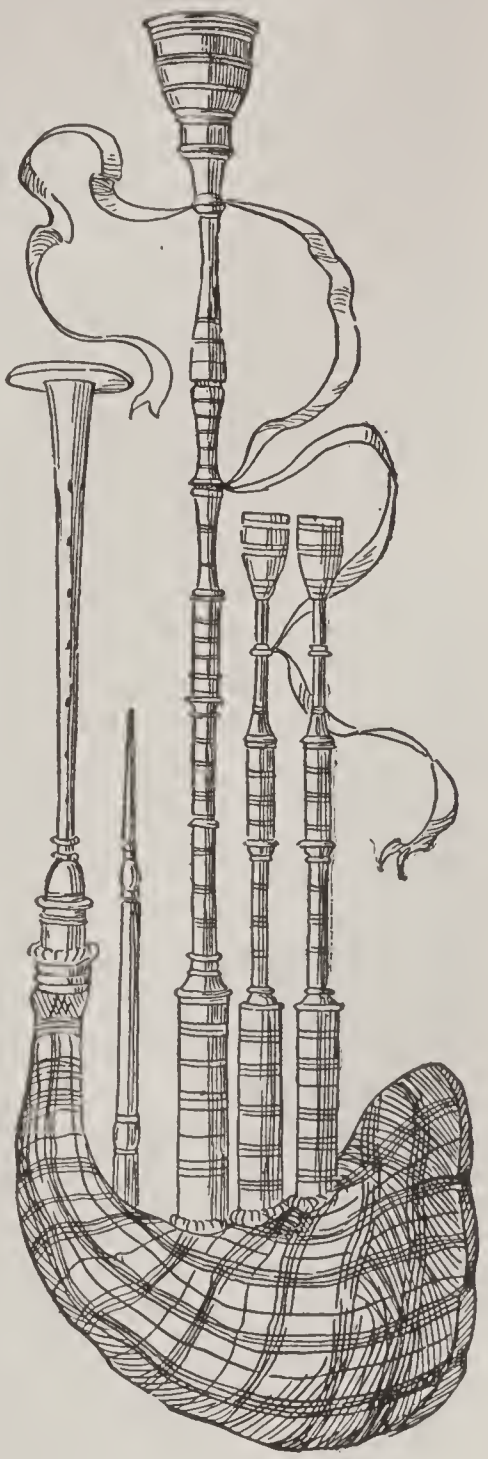
and the completion of the Bagdad Railway will greatly extend its commercial importance. The city was founded in A. D. 762 by the Caliph Almansur, and has been under Turkish rule since 1638. In 1915 a British expeditionary force, advancing northward from the Persian Gulf, reached Ctesiphon, only eighteen miles from Bagdad, and in 1917 another British army took the city and penetrated northward (see WAR OF THE NATIONS).

Bagdad Railway. Bagdad lies on the natural overland route from Constantinople to India, and the desirability of constructing a railway on this route was long seen. After Russian and British offers to build such a line were rejected, Turkey in 1902 officially gave the right to a German company. The Euphrates Valley or Bagdad Railway is usually called a German enterprise, but it is interesting to note that German capitalists invested only forty per cent of the capital, French capitalists supplied thirty per cent, and the balance was divided among Austrian, Swiss, Italian and Turkish financiers. The construction work proceeded slowly, and in disconnected sections, so that in 1914, when Turkey entered the War of the Nations, about 500 miles out of a total of 1,314 miles were actually in operation. With the outbreak of war the construction was pushed rapidly, both because the line was of military importance and because it was needed to transport to Germany and Austria-Hungary the mineral and agricultural products of Mesopotamia. W.F.Z.

BAGOT, *bag' ot,* SIR CHARLES (1781-1843), British diplomatist and colonial administrator, Governor-General of the Union of Canada in 1842. At various times from 1814 to 1834 he represented his government at Paris, Washington, Petrograd, The Hague and Vienna. While at Washington he negotiated the Rush-Bagot treaty, which limited the number and size of war vessels on the Great Lakes. In January, 1842, Bagot entered on his duties as Governor-General of Canada, the province which had been formed in the preceding year by the union of Upper and Lower Canada. Though ill health compelled him to resign before the end of the year, his term of office is important because it marks the beginning of responsible government in Canada. Baron Sydenham had recognized the principle a year before, but had not always acted in accordance with it. It was Sir Charles Bagot who first summoned Robert Baldwin to form a ministry whose responsibility to the legislative branch of the government was recognized (see BALDWIN, ROBERT). Bagot himself was a Tory, and believed the ministry should be responsible only to the Crown, yet he appreciated that he was in Canada not to gratify his own wishes but to govern in accordance with the popular will.

BAGPIPE, a musical wind instrument, now regarded as the national instrument of Scotland. It consists of a leather bag, into which air is blown through a pipe. Holding the bag under his left arm, the performer forces air into four other pipes by pressure of his elbow. In the Highland form, one pipe, called the *chanter,* plays the melody; of the other three, called *drones,* two emit a monotone in unison with the lowest note of the chanter and the third gives forth a note an octave lower. The

notes from the chanter are produced by means of holes, stopped with the fingers, or left open, as in playing a flute.



THE BAGPIPE

The bagpipe is of great antiquity, having been used by the ancient Greeks, and it is popular among the country people of Poland, Italy, France and Ireland. Scotland is by no means its original home, for it is thought to have been introduced into that country after William the Conqueror entered England in 1066.

BAHA'MA ISLANDS, or **LUCAYOS,** *lu kah' yos,* a group of British West Indian Islands lying northeast of Cuba and southeast of the coast of Florida. They are formed largely of wind blown coral sand. The principal islands are Grand Bahama, Great Abaco, Little Abaco, Andros Islands, New Providence, Eleuthera, Great Exuma, San Salvador, Acklin's Island and Great Inagua. Of the whole group, which numbers over 3,000 islands and reefs, twenty are inhabited, and the most populous is New Providence, which contains the capital, Nassau (which see). The principal product is pineapples, which form the chief export, though other fruits are also grown, as well as cotton, sugar, maize and ground nuts. The agave, from which sisal hemp is obtained, is extensively cultivated and its export is steadily increasing. Fishing for sponges also forms an important industry.

The Bahamas are a favorite resort for invalids suffering from pulmonary diseases. The first British settlement was made on New Providence toward the close of the seventeenth century. San Salvador, or Watling Island, is thought by some authorities to be the same as Guanahani, the land first touched on by Columbus in 1492. For location on map, see North America. Population, in 1911, 55,944.

BAHIA, *bah ee' a,* or **SÃO SALVADOR,** *souN sahl vah dohr,* one of the chief cities of Brazil, capital of the state of Bahia, had a population of about 348,130 in 1919. In size it is the third city of Brazil, being exceeded only by Rio de Janeiro and São Paulo. It is on the shore of the Bahia de Todos os Santos (bay of all the saints), which must not be confused with the famous coffee port of Santos. It is in latitude 13° south, and by water is 742 miles distant from Rio de Janeiro, 4,000 miles from New York, 4,500 miles from London and 7,670 miles from San Francisco.

Like many South American cities, Bahia is divided into two parts. The old or lower town, which lies on the long, narrow beach, has dirty, ill-paved streets, and is without protection from the surface washings from the slopes above. This section, typical of old colonial life, contains the markets, post office, railway station, consular offices and principal business houses. The upper town, chiefly a residence district, lies on the western slope of a ridge rising from 200 to 260 above the sea level. It is reached from the lower town by hydraulic elevators and by streets so steep that carriages cannot pass along them. Here are the governor's palace, a public library, a museum, a cathedral, considered the finest in Brazil, and a lovely garden or park on the brink of the bluff and overlooking both the bay and the open sea.

Bahia is called the "City of Churches," and contains over a hundred of these. The São Joao and Polytheania theaters are worthy of note. Various hotels and schools and a large number of fine residences render the upper town attractive, and it has electric lights, electric street railways and other modern improvements. The port of Bahia is commodious and sheltered, and the city is the center of the sugar, cocoa and tobacco trade of the state. It also exports diamonds and other precious stones, and maintains important cotton industries. Bahia is one of the few South American cities which have docks to accommodate the largest ocean liners. The harbor is the most strongly fortified in Brazil.

Bahia was founded in 1549 by Thomé de Sauza, who was the first Governor-General of Brazil. Twelve years later it was made the see of a bishop, and fifteen years later still it

received an archbishop. In 1624 the port was seized by the Dutch, who remained in possession for some months. In 1863 the seizure of the Confederate States cruiser *Florida* by Captain Collins of the United States ship *Wachusett* in the harbor of Bahia was a disregard of neutral rights for which the United States government apologized.

The history of Bahia has been singularly uneventful, but the completion of its harbor improvements is expected to be followed by a great expansion in commercial lines. The extension of the railway system from Bahia into the interior, which in 1916 was restricted to a line running northward, should also add to the prosperity of the city. H.M.S.

BAHIA BLANCA, *bah ee' a blang' ka,* is the most important seaport on the Atlantic coast of Argentina, more wheat and oats being shipped from here than from any other port of the country. It is situated on the Neposta River, three miles from its entrance into the bay of Bahia Blanca, and on the southern boundary of the province of Buenos Aires. Buenos Aires, the capital, is about 450 miles northeast. There is steamer communication between Bahia Blanca and European ports, and railroads connect it with all parts of Argentina. Millions of dollars have been spent in building docks and elevators for loading grain and in dredging the channels for sea-going vessels. Excepting Buenos Aires, Bahia Blanca is the largest wool market in the country.

The site was a trading post in 1829; the city did not begin to grow until about 1900, and it is therefore new. Most of the houses are low and are built of concrete, and the wide streets are so devoid of trees as to suggest that the place is too new to have trees. The municipal theater and the municipal administration buildings are noteworthy. Near the entrance to the harbor the government has erected Puerto Militar, a military and naval station.

Bahia Blanca is a Spanish name and means *white bay.* In 1918 the population was 44,143.

BAIKAL, *bi kahl',* the largest fresh water lake in Asia, situated in Southern Siberia, covering an area of 13,200 square miles, a trifle more than the combined area of the states of Vermont, Delaware and Rhode Island. It is surrounded by lofty and rugged mountains and has occasional depths of over 4,000 feet. The deepest recorded sounding is 4,997 feet, making it the deepest fresh-water lake in the world. The lake is frozen over from December to April and traffic is then conducted by sleighs. During the Russian-Japanese War (1904-1905) a railroad was constructed over the frozen surface of the lake for the conveyance of troops and supplies. The route of the Trans-Siberian railway skirts the southern shore, a new route having been opened in 1905. The salmon, sturgeon and seal fisheries are valuable and many oil wells are found in the vicinity of the lake. Over 300 rivers, mostly mountain torrents, empty themselves into Lake Baikal, the surplus waters being carried off by the Lower Angara, a tributary of the Yenisei River. For location on the map, see Asia.

BAIL, a legal term applied to the property or surety which one person pledges as the security for another under arrest, that the latter may enjoy his liberty until the date of trial. Bondsmen, those whose pledges are accepted as bail, must be owners of property in value usually double the amount required in the bond, and must be citizens of the state residing within reach of the court. The responsibility of a bondsman ceases if the person is rearrested upon his complaint. A person accused of willful murder cannot apply for temporary liberty on bail bonds.

BAILEY, Liberty Hyde (1858-), an American educator, one of the best known authorities on agriculture and rural conditions. He was born at South Haven, Mich., and received his college training at the Michigan Agricultural College, from which he was graduated in 1882. After serving for a year as assistant to Professor Asa Gray at Harvard and for five years as professor of horticulture and landscape gardening at Michigan Agricultural College, he was professor of horticulture from 1888 to 1903 at the New York State College of Agriculture at Ithaca. In 1903 he became director of that institution, and held the position until his retirement in 1913. Professor Bailey has been an authoritative and voluminous writer on botany and agriculture. His most important works include *Lessons with Plants; Botany, an Elementary Text for Schools; The Nature-Study Idea; The Country-Life Movement* and *The Practical Garden Book.* He is also the editor of *Cyclopedia of American Horticulture; Cyclopedia of Agriculture,* and the *Rural Science Series.*

BAINBRIDGE, William (1774-1833), one of the few American naval officers who have been voted gold medals by Congress for distinguished services. After sailing some years on merchant vessels, he entered the United States

navy in 1798 as a lieutenant. Two years later he commanded the frigate *George Washington,* which carried to Algiers the tribute the United States was required to pay the ruler of that country for commercial privileges in the Mediterranean. In 1801, as captain of the *Essex,* he cruised in the Mediterranean. Under Commodore Preble he commanded the frigate *Philadelphia* during the war with Tripoli, which put down the Barbary piracy. While chasing a blockade runner in 1804 his vessel grounded and was forced to surrender, the captain and his 300 men being held as prisoners for over a year. See BARBARY STATES.

In 1812 he commanded a squadron comprising the *Constitution, Essex* and *Hornet,* and later in the year captured the British frigate *Java* after a two hours' engagement in which the British lost 300 in killed and wounded, the Americans, thirty-four. It was for this achievement Congress voted the commodore a gold medal, and in addition voted his crew $50,000 as prize money. In 1815 Bainbridge commanded the Mediterranean squadron, and held the same post again in 1821, which was his last foreign assignment.

BAKER, SIR SAMUEL WHITE (1821-1893), a distinguished English explorer, the discoverer of the important lake Albert Nyanza. In 1861 he began his travels in Africa that resulted in the discovery of the lake named for Albert, consort of Queen Victoria, and that also added much to what was then known of the sources and course of the Nile. In 1866 he was made a knight. The following year he headed an expedition sent by the khedive of Egypt to annex and open up to trade a large part of the newly-explored country, and was appointed Governor-General of the new territory formed. His successor in this work was Colonel Charles Gordon (which see). Baker's writings include *The Albert Nyanza, Great Basin of the Nile, Cyprus as I Saw It in 1879* and *Wild Beasts and Their Ways.*

BAKERSFIELD, CAL., the county seat of Kern County and a thriving industrial city, situated in the southwestern part of the state, on the Kern River. Fresno is 106 miles northwest, Los Angeles is 171 miles southeast, and San Francisco is 313 miles northwest. The Southern Pacific and the Atchison, Topeka & Santa Fe railroads serve the city. The place was settled in 1869 and named in honor of Colonel Baker, an American soldier of early California history. In 1920 the population was 18,638, an increase of 5,911 since 1910.

Bakersfield is located in a stock-raising and fruit-growing section and is a shipping point for live stock, wool, hides, grain and fruit. It has large fruit-packing establishments, oil-refineries, foundries and railroad and machine shops. In the locality are found deposits of gold, gypsum, borax, marble, salt, copper, tungsten, iron and sulphur. The Kern River furnishes water for irrigation and power for manufactures. Bakersfield has a $400,000 courthouse, two high schools, a library and a county hospital. L.C.B.

BAKING POWDER, a fine white powder which the housewife uses in place of yeast to "raise" bread, biscuits and other preparations of flour or meal. The baking powder of best repute is made of cream of tartar and soda mixed with starch or flour. The starch or flour keeps the soda and cream of tartar dry and thus prevents their acting upon each other until ready for use. As soon as the baking powder is wet the cream of tartar attacks the soda and sets free carbonic acid gas. The gas, passing through the dough, makes it light and porous, and it "rises." Soda and sour milk have the same effect as baking powder.

Cheaper baking powders are made by using alum or acid phosphate of lime, or both, in place of the cream of tartar. As a food constituent alum has always been regarded with suspicion, but recent investigations by the Referee Board of Consulting Scientific Experts of the United States Department of Agriculture failed to reveal any injurious effects due to alum baking powders in the quantities used in an ordinary diet. They, however, advised against the excessive use of foods made with baking powders, since all the commercial kinds leave substances in the bread, which in large doses affect the bowels. See ADULTERATION IN FOODSTUFFS AND CLOTHING. J.F.S.

BAKU, *bah koo'*, a Russian port on the western coast of the Caspian Sea, and the commercial center of a district that produces nearly one-fourth of the world's supply of petroleum. The principal industries are connected with the pumping and refining of oil, but the city has large tobacco and chemical factories and big plants for distillation of water from the Caspian Sea for domestic purposes, for the water in the oily regions is unfit for home use. Baku, which has an excellent harbor, is also an important forwarding depot, transmitting eastern products from Persia and manufactured goods from Europe. The city presents a curious combination of ancient and modern

structures, the old town contrasting strongly with the new business section which has grown with the development of its principal industry. The harbor is strongly fortified, and under the empire was a station of the Russian fleet. Population in 1921, about 250,000.

BALAAM, *bay' lam,* a soothsayer and seer whom Balok, king of Moab, called upon to curse the Israelites when they were about to overrun his country. The first time the Lord commanded Balaam not to go, but the second time permission was given, with the command that Balaam was to do whatever the Lord commanded. On the way the angel of the Lord appeared before him with a drawn sword in his hand. By a miracle the ass which Balaam was riding saw the angel, but Balaam could not see him. The ass turned aside into the field, and Balaam struck her to force her back into the path. But the angel was still in front of the ass and she still resented, finally lying down under her master, and Balaam smote her the third time. The ass was then made to speak, and Balaam replied: "Because thou hast mocked me I would there were a sword in mine hand, for now I would kill thee." The narrative continues: "Then the Lord opened the eyes of Balaam and he saw the angel of the Lord standing in the way with his sword drawn, and he bowed down his head and fell flat on his face." Under the command of the Lord Balaam blessed the Israelites four times, and his prophecies are among the grandest in the Bible. See *Num.* XXII-XXIV.

BALAKLAVA, *bah la klah' vah,* a small port on the Black Sea, in the southwest of the

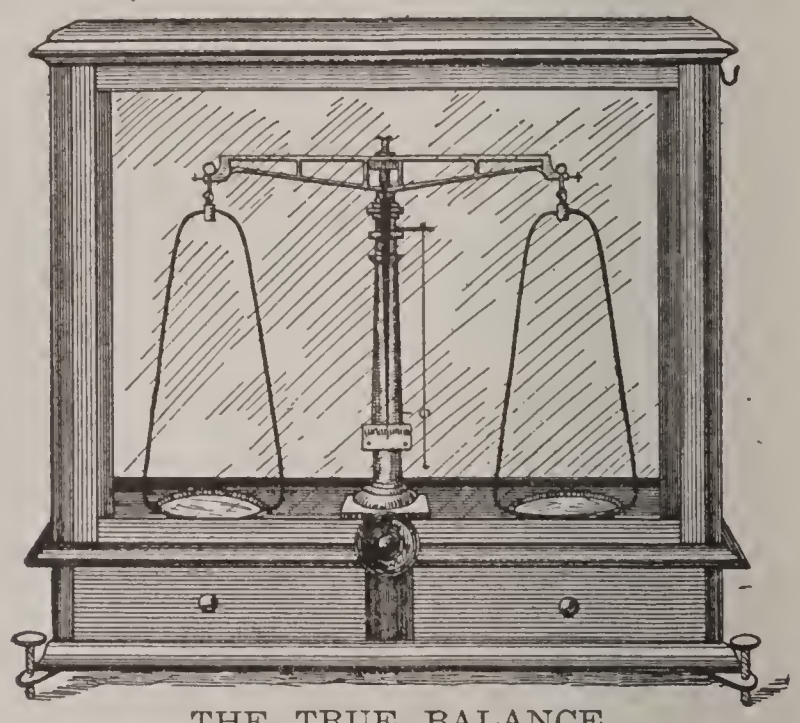
THE CRIMEAN PENINSULA
Locating the spot made famous by the "Light Brigade."

Crimea, famous for the battle of the Crimean War in which the heroic English "Light Brigade," riding to certain death, gave the world an unforgettable example of obedience.

The battle of Balaklava was fought on Oct. 25, 1854, between the Russian field army and the allied English, French and Turkish troops. Through a misunderstanding, an English brigade of light cavalry, numbering about 600 men, was ordered to charge the Russian cavalry stationed at the end of a long valley, the ridges on both sides of which were also held by the enemy's infantry and cavalry. At the word of command the "Light Brigade" swept down the plain, exposed to a deadly fire from the front and both sides, and only a remnant found their way back. (See CRIMEAN WAR.) This heroic charge inspired the stirring poem to which its author, Alfred Tennyson, gave the title, *The Charge of the Light Brigade.* One of the stanzas is here given:

Forward, the Light Brigade!
Was there a man dismayed?
Not though the soldier knew
Someone had blundered:
Theirs not to make reply,
Theirs not to reason why,
Theirs but to do and die:
Into the valley of Death
Rode the six hundred.

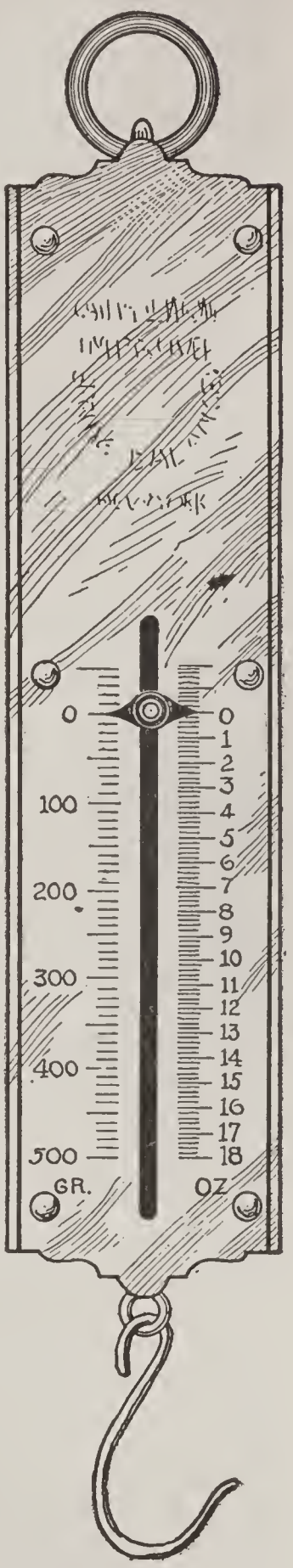
Balaklava is about eight miles southeast of Sebastopol (formerly Sevastopol). Its harbor is shut in by lofty hills, and the entrance is so narrow that scarcely more than one vessel can enter at a time. On the heights overlooking the bay are the houses of the inhabitants, mostly Greek fishermen, who number about 1,500.



THE TRUE BALANCE

BALANCE, a mechanical device for weighing substances, from almost the tiniest particle of matter to great masses of the heaviest material. The simplest form of weighing machine

is called a *spring balance,* which is not really a balance in the true sense of the word. In this device the goods to be weighed are placed in a pan which is suspended from or presses on a spring. The weight causes the spring to expand or close, forcing a needle or indicator round a dial, which is marked off in spaces indicating pounds and ounces. This form of balance is sufficiently correct for measuring meat and groceries, but is not so delicately adjusted as to measure drugs for medicine or other substances requiring the utmost accuracy.



COMMON SPRING BALANCE

The true balance consists of a horizontal arm from each end of which a pan is suspended. The arm is perfectly balanced across a knife edge of metal or other hard substance. In one of the pans is placed a weight; in the other, the substance to be weighed. When the weights in the two pans exactly correspond, the arm of the balance remains horizontal. If the weights are uneven one side of the arm will rise. Balances are made with such delicate adjustment that they will indicate the weight of a human hair; these are usually enclosed in a glass case to protect them from dust and prevent corrosion from the atmosphere. The Romans and Egyptians used a balance that is still almost extensively employed, known as a *steelyard* (which see).

BALANCE OF POWER, the condition which exists among nations when no one power or dynasty is sufficiently powerful to endanger the independence of other nations. The principle involved is as old as history, for it is nothing more or less than the law of self-preservation, expressed in diplomatic terms. If one nation, or a group of nations, becomes so powerful as to threaten the independent existence of less powerful neighbors, it is natural for the latter to form alliances in self defense and thus restore the balance wherein lies safety. Even primitive tribes have been known to unite forces against an aggressor.

While the principle is thus as old as history, it is only in modern times that it has become one of the fundamental doctrines of diplomacy. It is, in fact, the foundation of international law. Obviously, if any nation can impose its will on weaker countries, there is an end to international law, for in such case the will of the strongest is law. According to Grotius and later writers, it is not only to the interest but is the duty of every nation to interfere, even at the cost of war, when any member of the family of nations tries to disturb the balance.

Wars have been waged to preserve the balance of power as often as they have been waged to destroy it. Between 1648 and the fall of Napoleon in 1815, Europe was almost continuously at war, the preservation of the balance of power being the customary excuse for the endless rearrangement of alliances. The great coalition against Napoleon was one more attempt to secure the same end.

Since Napoleon's fall, the theory has still held its place in Europe's diplomacy. To this theory and to the diplomacy of Talleyrand, France owed the favorable treatment it received at the hands of the Congress at Vienna in 1815 (see VIENNA, CONGRESS OF). When Russian ambitions for expansion threatened the life of the theory, Great Britain and France fought the Crimean War to save it. The formation of the Triple Alliance, between the German Empire, Austria-Hungary and Italy, was followed by the Dual Entente, later the Triple Entente (which see), to offset the predominance of Germany in European politics. The balance of power was, therefore, one of the underlying causes of the War of the Nations in 1914. See TRIPLE ALLIANCE; TRIPLE ENTENTE. E.D.F.

BALANCE OF TRADE, in political economy, is the excess of exports over imports, or vice versa. If the exports are larger, the balance is said to be *favorable;* if the imports, the balance is *unfavorable.* The phrase first came into common use in the seventeenth and eighteenth centuries, in connection with the "mercantile theory," which measured the prosperity of a country by the amount of actual gold and silver it received or paid out for this

excess. It was then believed that no country was prosperous unless it received in cash more than it paid to other countries.

If the buying and selling of commodities were the only factors in creating a balance of trade, this doctrine would be sound. But as Adam Smith pointed out in 1776, money is merely a commodity which obeys the same laws of supply and demand as do dry goods, for instance. There are, moreover, transportation and commission charges, citizens' investments abroad, and local investments by foreigners, and other factors which should be included in a true balance of trade. As these factors cannot be accurately measured, the theory is no longer accepted by the majority of economists.

The balance of trade is still, however, a popular though inaccurate index of a country's prosperity. Campaign orators make it an issue without understanding, sometimes, what it means. A new country, such as Canada or the United States, usually shows a favorable balance of trade; its exports are larger than imports, and money comes in freely. As a matter of fact, the balance is really often unfavorable, for much of the money is coming for investment and is balanced by bonds and other evidences of debt which do not appear in the trade balance. W.F.Z.

BALBOA, *bal bo' a,* Vasco Nunez de (1475-1517), the first European who looked upon the waters of the Pacific Ocean from America's shores. Having dissipated his fortune in Spain, he sailed to America and was at Darien in 1510. An insurrection placed him at the head of the colony, and he immediately began a search for a great western ocean of which the Indians had told him, upon whose shores there was supposed to lie the famous land of gold. On Sept. 25, 1513, having reached the top of the mountains, he saw for the first time the Pacific, and five days later he stood upon the shore and claimed the new-found water and all the lands whose shores it washed, in the name of the king of Spain. He little realized the vastness of that domain.

Returning to Darien, he found himself supplanted by a new governor, and anger and jealousy at once arose on both sides. Balboa submitted, and Davila, the new governor, apparently became reconciled to him, but shortly afterward had him beheaded on a charge of intent to rebel. A great statue of Balboa graced the Panama-Pacific Exposition grounds at San Francisco in 1915.

BALDER, *bawl' der,* in Norse mythology the god who personified the sun and the charm of summer. He was the son of Odin and Frigga, and was a general favorite with the gods and goddesses because of his beauty and goodness. His one enemy was the wicked Loki, who hated him and plotted his destruction. Balder's mother, fearing that he might be harmed, had exacted from all the things in the world, save only a small spray of mistletoe that grew on an oak tree, a promise that they would not injure her son. The gods, therefore, made a pastime of hurling their dangerous weapons at Balder, that they might enjoy the sport of seeing them fall harmlessly to the ground. But the scheming Loki made a dart from the mistletoe, and this he put into the hand of Balder's blind brother, telling him how to throw it. As the dart struck Balder he fell dead. The death and funeral of the god, and his journey to the underworld, form the theme of a beautiful poem by Matthew Arnold, entitled *Balder Dead.* See Odin.

BALDNESS, complete or partial loss of the hair, resulting from various causes. It most frequently accompanies the physical changes due to old age; however, many instances of baldness are observed among men in the prime of life. Some such cases may be due to inherited tendency, but generally they are the result of severe illness or certain forms of skin diseases. The wearing of close fitting, unventilated hats or caps, and the use of too much alkaline shampoo are said to cause baldness. But in all cases the leading cause is that the hair fails to receive proper food, as a result of poor circulation of blood in the scalp.

The most effective treatment for preventing loss of hair consists in daily massage with the fingers or a brush for the purpose of increasing the circulation. Practically all advertised remedies which claim to grow hair on a bald scalp are worthless. If the sources of growth, the root and its nourishing vessels, are dead, no remedy can be of the slightest effect. Where loss of hair results from extreme dryness or scurfiness, an oil or vaseline that will clear away the scurf should be used. For old-age baldness there is never a cure.

Women are much less liable to baldness than are men. The probable explanation of this lies in the fact that they take better care of their hair and especially that they massage the scalp more frequently and do not destroy the natural oil of the scalp by using too much strong alkaline shampoo. Women wear their

hats fewer hours daily than do men, which also is to their advantage, and their headwear is lighter and better ventilated. E.D.F.

BALDWIN, Matthias William (1795-1866). "The locomotive-engine, built by M. W. Baldwin, of this city, will depart daily, when the weather is fair, with a train of passenger-cars. On rainy days horses will be attached." This

FIRST BALDWIN LOCOMOTIVE

Engine and coach of the train referred to in opening paragraph of this biography.

unique advertisement, which appeared in a Philadelphia paper in November, 1832, referred to *Old Ironsides,* one of the earliest American-made locomotives and the first to draw a train in the state of Pennsylvania.

Baldwin, its builder, had been apprenticed to the jewelry trade and while quite young had invented a simplified process of gold-plating. He graduated into the manufacture of bookbinders' tools, and later revolutionized the calico-printing industry by the invention of cylinders operated by steam power. Then, since the six-horse-power engine which he had designed for his own shop was proving so satisfactory, he launched out into the manufacture of stationary engines for the trade.

About this time people were becoming curious about the wonderful locomotives made in England by the Stephensons and others, some of which were being brought to America. As a business-getting novelty, the owner of the Peale Museum in Philadelphia ordered from Baldwin in 1831 a small working model of a train drawn by a locomotive. This consisted of an engine and two cars, each accommodating two passengers, and the tour of the museum was made over a circular track. The following year Baldwin was commissioned by the Philadelphia, Germantown & Norristown Railway to construct the practical locomotive figuring in the announcement quoted. He had an opportunity to make notes and sketches of the unassembled parts of a Stephenson locomotive which had just been received, but so simplified the combination scheme that *Old Ironsides* was actually superior to the English model. It was in active service for over twenty years.

His second engine was made in 1833 for the South Carolina Railway, and set a type which American locomotives have followed in the main ever since. After this many other orders came to him, and he began to organize a shop along new lines; he educated workmen in the special mechanics of the locomotive, designed the tools and machinery needed, and in general laid the foundations of the industry which has grown into the famous Baldwin Locomotive Works of Philadelphia—the largest business of its kind in the world. L.M.B.

BALDWIN, Robert (1804-1858), a Canadian statesman who contributed more than any other person to make responsible government in Canada an accomplished fact. Even in his own day his name was so inseparably connected with the struggle for government which should be responsive to the people's will that he was known as "the man with one idea." Yet his political achievements were not his greatest distinction. To him is due the admiration which comes to a politician by profession who never stooped to disreputable practices, either to win votes or to keep himself in office. Men differed then and may differ now as to the wisdom of his policies, but of his good faith to friend and opponent there is no doubt. In the midst of the bitter fight for responsible government, one of his most powerful opponents could say of him that he was "a gentleman highly respected for his moral character, moderate in his politics, and possessing the esteem and confidence of all parties." The extraordinary confidence in which his contemporaries held him was justified at every step in his career.

ROBERT BALDWIN

Robert Baldwin was born in York (now Toronto), on May 12, 1804. His father was a prominent lawyer, who also practiced medicine and taught school. The elder Baldwin in middle life inherited from a distant relative a large fortune which made him and his son

financially independent. The son studied law and became his father's partner in 1825. Their practice was large, but the son was drawn into politics, and after one defeat on a technicality was elected to the Upper Canada assembly in 1830. He lost his seat at the general elections in 1831, but during the next few years labored as a private citizen for the great cause which he had at heart. This cause was responsible government, which means the expression of the popular will through a ministry responsible to the people's chosen representatives, the legislature. Believing that Sir Francis Bond Head, then Governor-General, agreed with his views, Baldwin accepted an appointment to the executive council in 1836, but speedily resigned when he found that he had been deceived. The struggle for responsible government reached a climax in the rebellion of 1837, of which Baldwin disapproved. One of its results was the union of Upper and Lower Canada in 1841. With high hopes Baldwin again accepted an appointment to the council, but when it appeared that Lord Sydenham, the Governor-General, was placing obstacles in the way of real responsible government, Baldwin refused to lend his name to the support of the Governor-General and resigned.

In 1842 Sir Charles Bagot, appointed to succeed Lord Sydenham, fully recognized the principle at stake by summoning to his council only the leaders in whom the assembly had confidence. Of this ministry Baldwin was the head. In 1843, however, Baron Metcalfe compelled the resignation of the Baldwin ministry, and not until 1848 was rèsponsible government established beyond recall. Baldwin, with Sir Louis Lafontaine, organized a ministry, which held office for three years. During this period the amount of constructive legislation was unprecedented, including the organization of the municipal system in Ontario, the establishment of the University of Toronto on a non-sectarian basis, the creation of the courts of common pleas and chancery and the abolition of primogeniture (which see). Unfortunately, Baldwin's moderation did not meet the approval of many radical reformers. He refused, moreover, to pledge himself to secure the secularization of the "clergy reserves," and in 1851 was defeated for reëlection.

His health was already impaired, and the remainder of his days was spent in retirement. His defeat in 1851 was a bitter blow, but he preferred defeat to office held by deceiving the voters as to his views. "I go to the House," he said, "as a free man, or I go not at all. If you approve of my opinions, and elect me, I shall carry them out in Parliament. If I should alter those opinions I will come back and surrender my trust, when you will have an opportunity of reëlecting me or of choosing another candidate; but I shall pledge myself at the bidding of no man." Throughout his life those were his principles. G.H.L.

BALEARIC, *bal e air' ik,* **ISLES,** a group of fifteen islands forming a Spanish province, situated in the Mediterranean Sea a short distance east of Spain, the largest of which are Majorca and Minorca. Their combined area is 1,935 square miles. The coasts are rugged and dangerous but Minorca has one of the finest harbors in Europe. Vines, olives and other fruits are cultivated and the fisheries are valuable. The islands, previously forming a separate kingdom, were annexed to Spain in 1343. Population, 1919, 331,195.

BALFE, *balf,* Michael William (1808-1870), the composer, to whom the world will always be grateful for the bright and tuneful opera *The Bohemian Girl.* It contains three songs that are widely known and loved—*Heart Bowed Down, Then You'll Remember Me* and *I Dreamt I Dwelt in Marble Halls.*

Balfe was born in Dublin. He early displayed remarkable ability as a musician, playing difficult pieces for the violin at the age of seven, and writing a ballad two years later that was sung in public by a well-known artiste. At sixteen he joined the Drury Lane Theater orchestra, where he played the violin, and soon after went to Italy to study. In 1827 he was singing in Italian grand opera at Paris, but soon returned to Italy to take up the work of operatic composition. Of the thirty operas which he composed the ones which have found the highest favor with the public are, besides his *Bohemian Girl, The Rose of Castile* and *Satanella.* His operas please by reason of their sweet melodies and gayety.

BAL'FOUR, Arthur James (1848-), one of the foremost of present-day British statesmen, for more than twenty years the leader of the Conservative party in the House of Commons and Prime Minister from 1902 to 1905. Even after 1912, when he retired from official leadership of the Conservatives, he still remained in many ways their chief, and he was probably the most influential private member in Parliament. In 1915, when the War of the Nations caused the formation of a coalition

Cabinet under the premiership of Asquith, he was appointed to the important post of First Lord of the Admiralty, succeeding Winston Churchill. More than that, he became one of the inner council of the Cabinet, the group directly responsible for the prosecution of the war.

ARTHUR JAMES BALFOUR

Like many other Englishmen who have won fame in public life, Balfour first achieved distinction in literature, and his early political career was generally regarded with mingled amusement and scorn. He first sat in the House of Commons in 1874, but not for a decade did the House take him seriously. He was an Eton and Cambridge man, also a nephew of the third Marquis of Salisbury, and he belonged to the class which thought of membership in the House of Commons as a duty, almost to be passed from one generation to another, together with the family estates. He was thought by many to be amusing himself with politics, and his somewhat languid manner only added to the popular impression.

Not until 1887, when Lord Salisbury appointed him Secretary of State for Ireland, did he have opportunity to show his true worth. Previously he had served his uncle as private secretary, and had held the minor Cabinet positions of President of the Local Government Board and Secretary of State for Scotland. From 1887 to 1891, in spite of the jeers of the Irish Nationalists, he administered the duties of the latter office with good sense, although his strict enforcement of unpopular laws in Ireland caused some discontent. In 1891 he was promoted to the position of First Lord of the Treasury and Conservative leader in the Commons. These positions he held until 1902, except for the years 1892 to 1895, when he was leader of the opposition during the ministries of Gladstone and Rosebery.

As Prime Minister. On the resignation of Lord Salisbury, on July 11, 1902, Balfour succeeded him as Prime Minister. His succession to power practically coincided with the end of the South African War and the coronation of King Edward VII. While the war left many problems for the ministry, a new question caused its downfall after three years and broke its party into two. This question was whether or not Great Britain should abandon its historic policy of free trade. Balfour admitted the desirability of protecting British trade from unfair foreign competition, but he was opposed to the sudden and complete adoption of a protective policy such as was advocated by Joseph Chamberlain. By skilful parliamentary tactics Balfour held his party in power, but at the end of 1905 Chamberlain refused to wait any longer. Balfour resigned on December 4, and was succeeded by Sir Henry Campbell-Bannerman.

Since 1906 Balfour has represented the city of London in Parliament. His leadership of the Conservatives and Unionists was reëstablished after his defeat, and he also proved again his preëminence among parliamentarians. In 1909 and 1910 he counselled submission to the Liberal policy as shown in the famous budget submitted by Lloyd-George, an action which called forth such criticism from his own party that he resigned its leadership in November, 1912. He remained in Parliament, however, and in 1915 became the leading Conservative in the coalition war ministry. In 1917 he headed a British war delegation on a visit to the United States and the Dominion of Canada, and was enthusiastically received. For his services at the armament conference at Washington he was knighted in 1922. G.H.L.

BALIOL, *ba' le ol* or *bal' yol,* JOHN DE (1249-1315), king of Scotland from 1292 to 1296, a ruler who owed his succession to the throne to Edward I of England. On the death of Margaret, granddaughter of Alexander III, Baliol claimed the throne of Scotland by virtue of his descent from David, earl of Huntington, brother of William the Lion. Robert Bruce, a descendant of David by another line, opposed him. Edward I, invited to settle the dispute, decided in favor of Baliol, whom he induced to swear allegiance to him. Irritated by Edward's harsh exercise of authority, Baliol concluded a treaty with France, then at war with England, but after a crushing defeat at Dunbar in 1296 he was obliged to give up his crown to Edward. He was sent with his son to the Tower, but in 1297 obtained liberty to retire to his Norman estates, where he died.

Balliol College, one of the colleges in the University of Oxford (see OXFORD, UNIVERSITY OF).

BALKAN PENINSULA, the easternmost of the peninsulas of Southern Europe, called be-

cause of the turbulent nature of its inhabitants the "powder magazine of Europe." It is not, like the peninsula of Italy to the westward, one

BALKAN PENINSULA

An understanding of the size of the Balkan states of 1914 is reached by a study of the above maps, drawn to the same scale.

nation, for within its 175,000 square miles are comprised Albania, Bosnia, Bulgaria, part of Croatia, Greece, Herzegovina, Montenegro, Serbia and that small part of Turkey which is left in Europe. Rumania, though politically a Balkan state, is not geographically a part of the peninsula. These states are described in alphabetical order in these volumes.

The Balkan Peoples. The people who inhabit the Balkan Peninsula are not all of one race. Besides Albanians, who are descended from the ancient Illyrians, there are several Slavic families, Greeks and Turks. Yet all the Balkan peoples have certain common characteristics. Hot-tempered and quick to resent injustice, they have always been ready to turn the sword against each other. On the other hand, Greeks, Albanians and Slavs have long been united in their enmity to the Turks. Like the Swiss and other races who have developed their national history in a mountainous country, the people of the Balkans are imbued with the spirit of liberty. For centuries they chafed under the weight of Turkish oppression, but little by little they freed their mountainous peninsula from Oriental despotism, until now Turkey rules no more than one-eighteenth of the region. The only instance of a Slav race of the Balkans becoming an ally of Turkey occurred in 1915, when Bulgaria joined the Germans, Austrians and Turks in the War of the Nations.

Since the peninsula is in a measure isolated, the inhabitants might be left to fight their own battles, but almost inevitably other parts of Europe are drawn into their conflict. The Balkan War (which see) was practically a local affair, but the greatest conflict of all times, the War of the Nations, had its final cause in an outbreak in one of the Balkan states. See WAR OF THE NATIONS.

Geographical Features. The Danube and the Save rivers form the northern boundary of the peninsula. To the east is the Black Sea, to the south the Sea of Marmora, the Dardanelles and the Aegean Sea, and to the west the Adriatic and the Ionian seas. As a whole, the region is very mountainous, the chief range being that from which the peninsula takes its name, the Balkans.

Balkan Mountains. This mountain chain, the name of which means *high ridge,* is the eastern branch of the Alpine system of Central Europe. It forms the watershed between the Danube and the short, rapid rivers of the Balkan Peninsula. Beginning at the Iron Gates of the Danube, where the boundaries of Hungary, Serbia and Rumania come together, it extends southward through Serbia, then eastward through Bulgaria to the shores of the Black Sea. There are a number of peaks over 7,000 feet in height, the tallest reaching an altitude of 7,789, and several passes lie at a height of from 4,000 to 5,000 feet. Valuable deposits of iron, copper and lead are found in the western part of the Balkans. E.D.F.

BALKAN WARS, the wars waged in 1912-1913 by Bulgaria, Greece, Montenegro and Serbia against Turkey, and another conflict, the outgrowth of the first, in which four Balkan states were allied against Bulgaria.

The First War. It is sometimes said that the causes of the Balkan Wars go back to the Treaty of Berlin, in 1878, when the powers of Western Europe intervened between Russia and Turkey. In fact, however, they must be

traced to the fourteenth and fifteenth centuries, when the Turks laid the foundations of their European empire. Thereafter, until the beginning of the nineteenth century, the Balkan peninsula was never free from Turkish rule. Uprisings and wars were many, but in spite of occasional defeats the Turks maintained their dominion. The natives of the peninsula, however, never became Turks, in spite of every effort to suppress race feeling among them. The Turks, though cruel and merciless to the conquered foe, left them two privileges, the right of local self-government and freedom of worship, which went far to keep burning the flame of national consciousness. Parts of Greece, for example, were under Turkish rule for four centuries, yet the people remained Greeks and Christians.

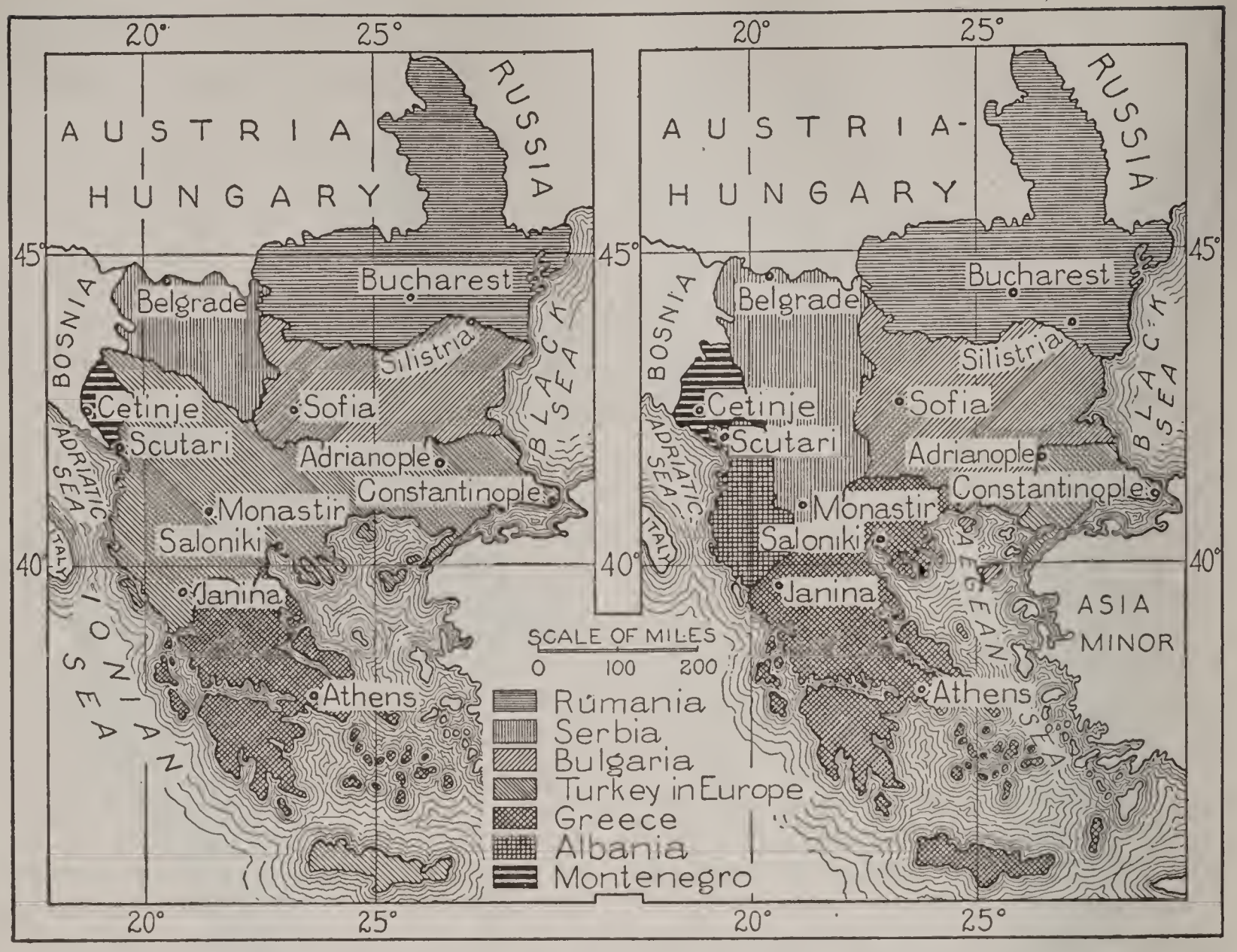
The Eastern Question. The gradual decline of Turkish power in Eastern Europe during the seventeenth and eighteenth centuries coincided with the development of strong national units in Western Europe. Russia, too, began to expand, largely at Turkish expense, and occasionally offered some encouragement to the Slavic peoples in the Balkans in their continuous warfare against the Turks. The expanding interests of the European powers, particularly England, Russia and Austria, conflicted not merely with each other and with Turkish desires, but also with the nationalist aspirations of the Balkan peoples. One by one the Balkan states, beginning with Greece in 1830 and ending with Bulgaria in 1908, declared their independence and won acknowledgment of it through pressure exerted by the powers upon Turkey. Yet these same powers prevented the Balkan states from attaining their ultimate ambition, the adjustment of boundaries according to nationality. Every one of the Balkan countries, except Montenegro, ruled a large section of territory which was claimed or coveted by another, and Turkey still held Macedonia and Albania, which all of them wanted.

This triangular conflict of interests has occupied the attention of European diplomats since the middle of the eighteenth century, and is generally summarized as the Eastern Question. The Congress of Berlin (see BERLIN, CONGRESS OF) established a delicate balance of interests which survived for a generation, but in 1908 and 1909 the *status quo,* that is, the existing condition, was overturned. The successes of the young Turks (which see), the proclamation of Bulgaria's independence, and the annexation of Bosnia and Herzegovina by Austria produced a new set of problems. In the Turkish part of the peninsula, moreover, oppression finally drove the inhabitants of Northern Albania into revolt in 1910, and in the next year the war with Italy greatly weakened the Turkish military power.

The Attempted Solution. This combination of circumstances led the Balkan countries to form what many wise statesmen had believed impossible, a league against Turkey. Sinking their own differences for a time, they declared war against the latter. Their reasons as stated by Czar Ferdinand of Bulgaria were that the Christians under Turkish rule in Albania and Macedonia had not been able to obtain conditions of life that were bearable, and that "to succor the Christian population of Turkey remains to us no other means than to turn to arms." This was a part of the reason, but the immediate occasion for war was the probability, almost a certainty, that Turkey would be defeated. Reorganization at home and the victory of Italian arms in Tripoli left Turkey handicapped to meet the new attack. It was less a war of liberation than a war of conquest. The elimination of the Turk from Europe was the first step in the solution of the Eastern Question.

The War. In September, 1912, the Balkan countries began to mobilize troops, and in October military operations were begun. According to the plan of campaign the Montenegrins were to capture Scutari; the Serbians were to drive the Turks from Macedonia; the Bulgarians were to overcome the Turks in Thrace and then move on towards Constantinople; the Greeks were to capture Saloniki. The four armies moved forward at practically the same time. The Turks, unable to mass their forces to resist any one attack, were defeated by the Bulgarians in the great battles of Kirk-Kilisse and Lule Burgas, and within three weeks had lost several important fortresses. The main Turkish army took a strong position behind the works at Tchatalja, the only stronghold between the allied forces and Constantinople. On November 8 the Greeks captured Saloniki.

Proposals for Peace. The speedy victories of the allies forced the Turks to ask for a stay of hostilities; an armistice was declared December 3, and a peace conference was called to meet at once in London. The allies demanded that Turkey abandon her territory in Europe, except a small region around Constantinople,



BEFORE AND AFTER THE BALKAN WARS
At the left, the boundaries of the countries before the conflicts; at right, the boundaries after peace was declared.

and pay a war indemnity. These conditions the Turks regarded as too humiliating, and the delegates could reach no agreement.

The War Resumed. The Balkan delegates withdrew from the conference, and hostilities began again in February, 1913, continuing until May 3. During this second campaign Janina was captured by the Greeks, the Bulgarians took Adrianople, and Scutari fell before the Montenegrins.

Second Peace Conference. A second peace conference met in London on May 20, and on May 30 arranged a treaty of peace between Turkey and the Balkan states. By this treaty Turkey lost nearly all her territory in Europe; Albania was made an independent principality; Serbia obtained large additions of territory in Macedonia; Bulgaria secured an extension of territory to the Aegean Sea, and secured Adrianople; and Greece gained Crete and extended her boundaries to include the province of Saloniki.

The Second War. Evidences of jealousy among the allies first appeared a month after the opening of hostilities, when the Bulgarians and Serbians insisted on sending some of their troops to Saloniki, which had already been occupied by the Greeks. A more serious problem, which now appeared, concerned Albania (which see). In March, 1912, Bulgaria and Serbia made a secret treaty providing for a division of the territory they planned to conquer from Turkey. By this agreement Serbia was to receive the greater part of Albania, and thus win a port on the Adriatic Sea. Serbia was deprived of this territory by the erection of Albania into an independent principality. Bulgaria, on the other hand, by the treaty of peace received not merely the territory agreed upon by the secret treaty with Serbia, but also Adrianople and a considerable area in addition. Serbia at once claimed that the treaty of peace established new conditions as a result of which "Bulgaria should not expect the preliminary engagements to be carried out." To this claim Bulgaria replied that a treaty was a treaty, and that the gain of eastern Thrace in no way invalidated the old agreement.

In April, 1913, Serbia announced that it would not be bound by the treaty of alliance of

March, 1912, and for two months following there was an unofficial state of war. The Greeks, too, set up extravagant claims against the equally extravagant claims of Bulgaria with reference to Saloniki and the Aegean coast. In June, when it was already apparent that Bulgaria, rather than yield to the claims of Greece and Serbia, was preparing for war, Rumania notified Bulgaria that it would not remain neutral in a second war except for a territorial consideration. Bulgaria's hesitation made Rumania an ally of Serbia and Greece; Montenegro, as Serbia's particular ally, was also involved.

Hostilities were begun by the Bulgarians on June 30, 1913, and by the end of July the war was over. Against Serbia, Greece and Montenegro, Bulgaria had an even chance, but the addition of Rumania, which declared war on July 10, made the odds hopeless, and on July 21, when the allies were within twenty miles of Sofia, Bulgaria asked for an armistice. By the Treaty of Bucharest, signed on August 10, Bulgaria lost a considerable part of the territory taken from Turkey. The latter, in the meantime, seized the opportunity to retake Adrianople, which had been given to Bulgaria by the Treaty of London, and Bulgaria was obliged to cede the fortress and a large area beyond it to Turkey.

Effect of the Wars on European Diplomacy. The two Balkan Wars, instead of providing a settlement of the Eastern Question, created new problems, and left Europe in a state of general distrust which was one of the causes of the War of the Nations. All the antagonisms of the nations involved, instead of being lessened, were sharpened by the realization that the situation left by the treaty of peace could not last. In fact, before peace was finally declared, each of the great European powers was making preparations for war. The budgets of 1913 provided increases in equipment and personnel greater than had ever been provided before, and the possibility of a general European war was again considered by careful observers. The spark for the conflagration was the assassination of the Archduke Francis Ferdinand, heir to the Austrian throne. See WAR OF THE NATIONS.

Summary of Losses and Gains. In both the first and second wars Bulgaria bore the brunt of the fighting, lost more soldiers and spent more money than any other of the Balkan countries, while Greece and Montenegro, in proportion to their expenditure of money and

Outline and Questions on the Balkan Wars

I. The First War

(1) Far-reaching causes
  (a) Turkish domination in the peninsula
  (b) Failure to suppress race consciousness
  (c) Prevention by European powers of division according to nationality
(2) Immediate causes
  (a) Bulgarian assumption of independence
  (b) Annexation of Bosnia and Herzegovina by Austria
  (c) Oppression of Albania
  (d) Turko-Italian War
(3) League of the Balkan states
(4) The actual struggle
  (a) Defeat of Turks at Kirk-Kilisse and Lule Burgas
  (b) Capture of Saloniki
  (c) Unsuccessful peace proposals
  (d) Resumption of hostilities
    1. Capture of Janina, Adrianople and Scutari
(5) The treaty
  (a) Loss of nearly all of Turkish territory in Europe
  (b) Independence of Albania
  (c) Territorial additions to Serbia, Bulgaria and Greece

II. The Second War

(1) Jealousy among the allies
  (a) Serbian resentment at Bulgarian claims
(2) Greece, Serbia, Rumania and Montenegro join against Bulgaria
(3) Bulgarian submission
(4) Results
  (a) Bulgarian loss of territory
  (b) Turkey regains Adrianople

III. International Effects

(1) No settlement of Eastern Question
(2) Increased antagonism among states
(3) One of causes leading to War of the Nations

Questions

What other war was a determining cause of the first Balkan War?

What three strongholds were taken by the allies in the second struggle?

In what way would Bulgaria have been better off if it had not brought on the second war?

How did the Balkan states manage to retain their race consciousness through centuries of subjection?

Why were the Turks defeated with such ease in the first struggle?

What was Serbia's grievance against Bulgaria at the close of the first war?

What was the result to Turkey of the first war?

What is the "Eastern Question"? Was it settled by the Balkan Wars?

What interest did Russia have in the Balkan question?

Why could not the first peace conference settle matters at the close of the first war?

At the end of the second, which state received the largest increase in area? In population?

COST OF THE WARS, 1912 TO 1913

	Total Army	*Killed and Wounded*	*Percentage, Killed and Wounded*	*Expenditures of Money*
Bulgaria	350,000	140,000	40.0	$436,500,000
Greece	150,000	30,000	20.0	121,250,000
Montenegro	30,000	8,000	26.6	3,880,000
Rumania*	250,000	35,000	14.0	75,000,000
Serbia	250,000	70,000	28.0	242,500,000
Turkey	450,000	100,000	22.2	388,000,000
Total	1,480,000	383,000	25.9	$1,267,130,000

* The figures for Rumania are estimates, and are probably too large.

GAINS IN TERRITORY AND POPULATION

	Area Acquired		Increase in Population	
	Squarc Miles	*Percentage of Increase*	*Numerical*	*Percentage*
Bulgaria	6,111	16.4	600,000	13.86
Greece	16,919	67.6	1,700,000	63.76
Montenegro	2,129	60.7	230,000	79.31
Rumania	2,969	5.8	350,000	4.82
Serbia	15,241	81.8	1,636,000	55.32
Total	43,869	32.4	4,516,000	25.82

men, received the greatest increases in territory. The above tables summarize the cost of the wars to each of the nations involved and also indicate approximately the gains made by each. W.E.L.

In the War of the Nations (1914-1918) Bulgaria allied itself with the Central Empires and with them went down to defeat. Greece and Rumania profited in territory from the allied victory; Serbia, Montenegro and Albania entered the new Jugoslavia; the powerful local states are therefore Jugoslavia and Rumania.

BALKASH, *bahl kahsh',* a large inland body of salt water, lying 780 feet above sea level, near the eastern border of Russian Central Asia. Its area of 8,500 square miles is one-third that of the Canadian province of Nova Scotia, a little larger than that of the state of Massachusetts and nearly three times as great as that of Salt Lake in Utah. Its length is 330 miles, and its width varies from six miles in the eastern portion to fifty-four miles in the west.

BALL, Thomas (1819-1911), an American sculptor whose influence in his special field of work has been permanent and uplifting. His first interest in art was acquired in his early youth, and was due to his being employed by the old New England Museum, in Boston, as boy-of-all-work. He first took up the study and practice of portrait painting, beginning his work as a sculptor by modeling a small bust of Jenny Lind, who was at the time appearing in song recitals in America. Then he attempted busts of other personages, and finally achieved success when he completed a life-size bust of Daniel Webster. In 1854 he was able to go to Florence, Italy, for further study, and remained there two years. Much of his later life was also spent in that city. He died in Montclair, N. J.

Ball devoted four years (1860-1864) to modeling an equestrian statue of Washington, and when it was unveiled in New York it was declared to be the best of its type produced up to that time. A few years later he completed his statue of Edwin Forrest in the rôle of Coriolanus, now a prized possession of the Actors' Home in Philadelphia. In 1875 a bronze representation of Lincoln freeing a kneeling slave —the *Emancipation Group*—was unveiled in Washington, and the following year saw the completion of the colossal bronze, *Daniel Webster,* in Central Park, New York. His statue of Josiah Quincy occupies a prominent place before the city hall, Boston, and in the Forest Hills Cemetery of that city is the well-known head, *Saint John, the Evangelist,* sculptured by him.

Ball was seventy years of age when he began the masterpiece of his later period, the *Wash-*

ington monument at Methuen, Mass. A notable bronze figure of the Father of His Country surmounts a great block of Carrara marble, at the base of which are four seated figures representing Oppression, Revolution, Victory and Cincinnatus. Above these are busts of four important generals who fought with Washington. Ball's figures were always notable in conception and dignified in treatment.

BALLAD, *bal' ad,* a story poem which is written not in the flowing meter and carefully chosen words which distinguish most poetry, but in a crude, almost rough, style and in the simplest and most natural of words. These differences are explained by the manner in which ballads were written, or rather, grew up; for most of the true ballads had no one author. In such a poem, for instance, as Bryant's *To a Waterfowl,* it is easy to understand how the poet, having seen the solitary bird and been impressed by it, went to his home and wrote down his thoughts and feelings in poetic form. He chose the very best words he could, studying long over some of them, and made the lines as musical as a song. But no ballad had such a history.

When an event occurred, as a great battle, the marriage of a hero, the death of a beautiful girl, the people of some little village would gather to talk of it, and to celebrate or to mourn. Over and over the event would be described, until gradually the more gifted persons would make a sort of song of the tale, one person contributing a line, perhaps, and then another. Thus grew up the earliest ballads, strictly in the language of the people. There was no printing in these early ballad days, but parents handed down the verses to their children from generation to generation. Occasionally stanzas would be dropped or others added, and once in a while a man of unusual poetic ability would work over the ballad and make it more perfect.

So there grew up among every European people a ballad literature, each country with few exceptions possessing its own "folk songs," as they are sometimes called. As learning spread and printed books became common, the literary class often knew nothing whatever of these old verse tales which the people treasured in their hearts; but occasionally there arose a man who had an intense interest in old literary forms, and who anxiously sought out the ballads, taking them down from the lips of old peasants who could not remember the time when they did not know them. In England and Scotland in the seventeenth and early eighteenth centuries these were often printed on single sheets of paper, "broadsides," as they were called, and sold in the street.

Finally an Englishman, Percy, began to make a real study of ballad literature, and in 1765 published his *Reliques of Ancient English Poetry.* This served to interest others, and in the continental countries, especially in France and Germany, a similar revival took place. In England, Scott was among those who took up the study, publishing in 1802-1803 his *Border Minstrelsy.* These old ballads had a real influence on the writing of other forms of poetry, which had shown a tendency to become stilted and artificial but now took on a greater freedom.

Among the most famous of the old English and Scottish ballads are the series known as the *Geste* (or Deeds) *of Robin Hood, Sir Patrick Spens, The Two Corbies, Fair Helen of Kirkconnel Lea* and *The Ballad of Chevy Chase.* Many of the best-known English poems show the influence of the ballad, being imitations in form or in subject, as witness the following: Coleridge's *Rime of the Ancient Mariner,* Tennyson's *Revenge,* Rossetti's *Sister Helen,* Macaulay's *Horatius at the Bridge,* Campbell's *Lord Ullin's Daughter,* Cowper's *John Gilpin's Ride* and Longfellow's *Wreck of the Hesperus.* An idea of the form and manner of the old ballad, with all its crudeness, may be seen from the following stanzas from *Chevy Chase,* a ballad of the days of James I:

At last these two stout earls did meet;
Like captains of great might,
Like lions wode, they laid on lode,
And made a cruel fight.

They fought until they both did sweat,
With swords of tempered steel,
Until the blood, like drops of rain,
They trickling down did feel.

A.MC C.

BALLARAT, *bal a rat',* an important city in Victoria, Australia, the center of one of the richest gold-yielding districts in the world. In 1851 it was the scene of a most remarkable "gold rush," during which the largest nuggets ever unearthed were found, one specimen being sold for $52,500. The gold mining brought other industries to the town and now it has large iron foundries, flour mills and distilleries. It is divided into two distinct municipalities, Ballarat East and Ballarat West. It is seventy-four miles northwest of Melbourne, with which it is connected by railroad. It also has railway

connection with all important Australian towns. From a rough mining camp, Ballarat has quickly developed into a well-built, flourishing town, with handsome public buildings, excellent schools and beautiful parks and gardens. It is the see of both Roman Catholic and Protestant bishops, and has two fine cathedrals. The surrounding district is particularly suited to sheep breeding, and great quantities of wool are exported. Population in 1921, 38,500.

BALLET, *bal lay'*, an artistic dance, developed and perfected in France, now used chiefly between the acts in a theatrical performance. Its original aim was to represent actions and feelings through dancing and gestures. This idea arose early in the eighteenth century, but the modern ballet is a spectacular dance rather than a dramatic representation, the main purpose being to please the eye. The ballet as used in modern operas is more nearly the ballet of old, for it is usually more or less closely connected with the play and incorporated in it, as in *Faust* and *Tannhäuser*. The costumes used in the ballet of to-day are extremely expensive. To secure the effects desired the most delicate fabrics and daintiest shades and hues are employed, and the designing calls for the utmost in art and skill.

The modern ballet is almost always danced by girls who are chosen because of their beauty, and the gowns and dances are designed to exhibit their charms. For this reason many people believe the influence of the ballet is not altogether wholesome, and frequently it may be pernicious.

BALLOON, *ba loon'*. From the earliest times man has known how to navigate the seas, but to navigate the air was a far more difficult problem, not solved for many centuries. Birds did it, even large and heavy birds; it was, therefore, evident that the air could be made to support weight that was properly distributed and properly buoyed up, but the method was not apparent. That the ancients speculated on the subject may be seen from the legend of Daedalus and his son Icarus, and their attempted flight across the sea (see DAEDALUS), but nothing practical was accomplished until toward the end of the eighteenth century, when the balloon was invented. A balloon is distinguished from an airship or flying machine, the other modern air-navigating device, by the fact that the former uses gas or hot air to make it buoyant, while the latter depends on complicated machinery, and is heavier than air.

Historical. It is almost impossible, in a day when air craft have become so common as to attract comparatively little attention, to realize the intense excitement that prevailed over the first successful balloon. It was an Englishman

A PRESENT-DAY BALLOON

named Cavendish who first announced the principle that a bag of some light material filled with a gas lighter than air, preferably hydrogen, was certain to rise naturally. However, he made no attempt to prove his theory by an experiment, and it was left for two Frenchmen, the Montgolfier brothers, to carry out his principles. They read Cavendish's book, experimented on a small scale, and finally, on June 5, 1783, sent up a great sphere of paper-covered pack cloth, thirty-five feet in diameter. They did not use hydrogen to inflate their balloon, but hot air, obtained by burning damp straw and wool in a little grate below the open mouth of the bag. Any child who has sent up paper balloons by burning alcohol on a sponge at their openings, knows exactly the principle on which this first big balloon was operated. It went up into the air over a mile, and came down safely; and the conquest of the air had begun.

Improvements. But the hot-air balloon had its disadvantages. When the air cooled, the balloon was bound to fall, and its time in the air could not be regulated; but a scientist of Paris, Professor Charles, in August, 1783, constructed a balloon which had practically all

the features of a balloon of to-day. It was made of varnished silk, and was filled with hydrogen, which it had taken Professor Charles four days to produce by the slow methods then employed. Scores of thousands of people gath-

MONTGOLFIER BALLOON
It operated on the same principle as the present-day paper balloons, so popular with boys and girls on festive occasions.

ered to watch it as it rose over Paris, and for almost an hour it remained in view, about 3,000 feet above the earth; but then it began to drift, and later came to earth fifteen miles away in a field, where it was torn to pieces by the terrified peasants. The next step was the sending up, in a car below the gas bag, of live passengers—a fowl, a duck and a sheep; and in November, 1783, two men ascended in a hot-air balloon to a height of 500 feet, and traveled for five miles before descending. As always when inventions are in progress, there were not lacking men who, through scientific interest or sheer love of adventure, were willing to risk their lives in perilous balloon ascensions, and in 1785 two men crossed the English Channel from Dover to Calais.

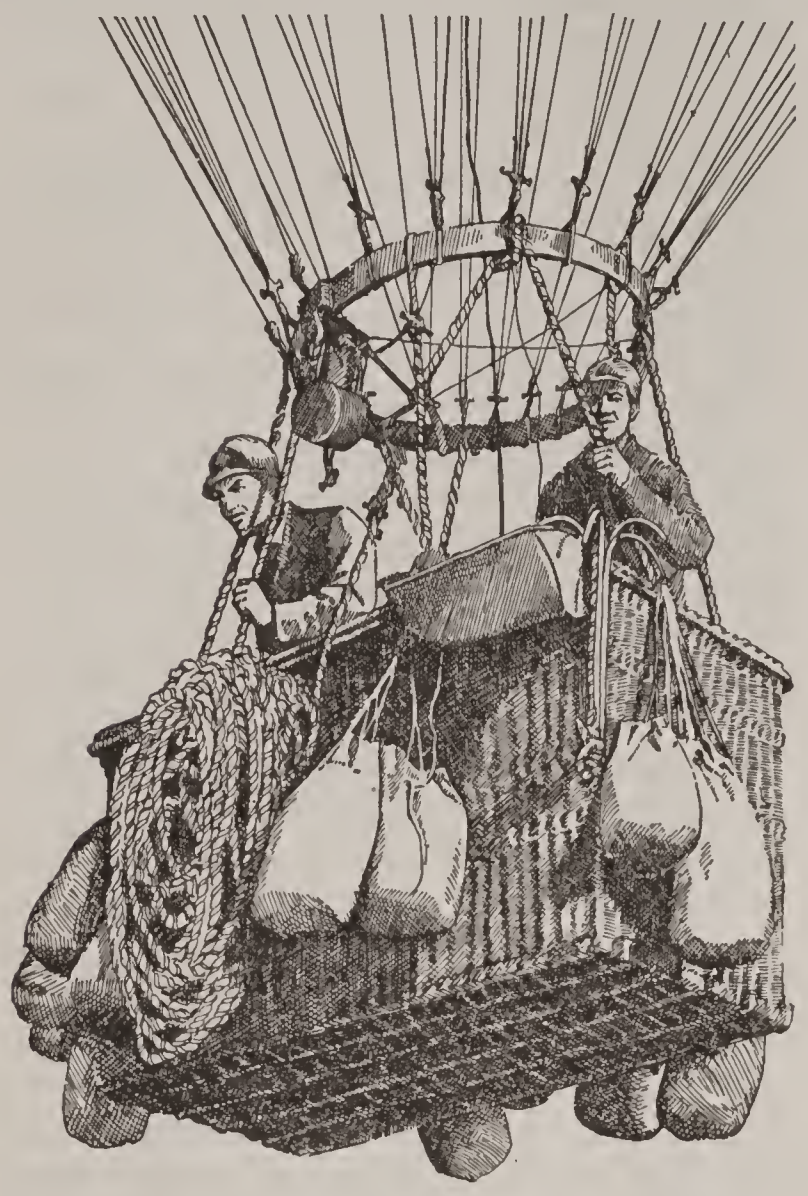
Modern Balloons. Improvements continued to be made in details, though not in principle, until the balloon of to-day was evolved. This consists of a bag of soft cloth, silk, woolen or cotton, coated with rubber varnish and covered with a network of cords, to which the wicker car for passengers is attached. In the top is a valve for the escape of gas, operated by a cord which reaches into the car, and the bottom of the bag is left open. The gas most used is coal gas, which is far cheaper than hydrogen but not so entirely satisfactory because of its greater heaviness. A balloon which is to carry any considerable weight must be large, and some with a diameter of 118 feet have been constructed.

Besides the human freight in the dangling car, the aeronaut has his instruments, thermometers and barometers for the reading of atmospheric conditions, and a quantity of ballast, usually in the form of sand-bags, which may be thrown out when he wishes to rise to a greater height. By means of these and the valve he can control his ascent and descent, but that is all the guidance he can give; as to horizontal directions, the balloon must move "at the wind's will." Dirigible balloons or "guidable" balloons, have been invented and have proved most useful, but on account of the machinery necessary for their control they are classed rather as airships. See FLYING MACHINES, subhead *Dirigible Balloons*.

Uses of Balloons. The uses of these balloons which cannot be directed are, of course, limited, but they have been of value in the securing of scientific information as to air conditions. Since men cannot breathe if more than a certain distance above the earth, unlimited upward flights are impossible for manned balloons, but little ones of india-rubber have been sent up frequently to great heights, and the recording apparatus attached to them gives valuable information. The balloons themselves do not return to the earth, for the inner pressure explodes them in the thin upper atmosphere, but a parachute brings the instruments down in safety. In 1912 one of these *sounding balloons,* as they are called, which was sent up from Pavia, Italy, reached a height of 123,505 feet (nearly twenty-five miles) and brought back the information that at that great height the temperature was —60°, and the pressure of the air only $\frac{1}{250}$ of what it is at the earth's surface.

In warfare, balloons have been used in various ways. The besieged people of Paris, during the Franco-German War, in 1870-1871, conducted most of their communication with the outside world by means of them, and since that date every large country has had in its military service a balloon corps. It is not the freely moving balloon which is of use in mili-

tary operations, but the *captive* or anchored balloon. It is attached to a cable, by means of which its movements are controlled, and it floats above the field just high enough to make clear observation possible. The great usefulness of balloons in such operations was further



BASKET OF BALLOON

The weights on the sides are sand-bags, referred to in the text.

demonstrated in the War of the Nations, which began in 1914; each nation used them as stationary observation stations, leaving them in the air but a few moments at a time, then hauling them down to positions of safety. For most uses of observation and scouting, however, aeroplanes have proved far more effective, for they can mount to great heights with observers and move with incredible swiftness.

Balloon Records. For half a century the altitude record for balloon ascents was that of Coxwell and Glaisher, who, in 1862, reached a height of almost six miles. In the rarefied upper air one of the aeronauts became unconscious, and the other nearly so; thirteen years later two men died in mid-air during ascensions in France. When two German aeronauts made an ascent in 1901 to a height of 35,600 feet (nearly seven miles), they carried with them oxygen for inhaling, and so reached earth in safety. Their record has not yet been broken. In 1895 Salomon August Andre, a Swedish scientist, attempted to reach the North Pole in a balloon. Had he been successful he would have established the world's record not only in ballooning but in polar exploration and discovery. However, his fate is unknown, for no word ever came from the expedition (see ANDRE, S. A.).

In long-distance balloon traveling the record was established in 1913, when one of the contestants for the James Gordon Bennett cup race sailed from Stuttgart, Germany, to the neighborhood of Moscow, a distance of 1,361⅝ miles. Every year competitions for this cup are held, the race starting in the country which won the cup the year before. Air-navigation by means of balloons has thus become a sport rather than a serious pursuit, and it seems unlikely that new uses for unguided balloons will ever be evolved. C.H.H.

BALLOT, *bal' ut,* a device employed for the expression of preferences in secret voting. The word is derived from the French *ballotte,* meaning *a little ball; voting by ballot* takes its name from the ancient custom of using colored balls in secret voting. Even to-day applicants for membership in clubs, lodges, etc., are voted on by means of balls, and a person rejected is said to be *blackballed.* Debating and literary societies and similar organizations usually elect their officers by writing names of candidates on small slips of paper.

The form of ballot most widely used in modern political elections is the written or printed ticket. Such ballots were in use in nearly all of the original thirteen American states when the Constitution was ratified, and were adopted gradually by the states that later came into the Union. Certain grave defects were characteristic of early methods of voting. It became the general custom for the political committees of the various parties to prepare and distribute the ballots, and the tickets were arranged in such a way that it was very difficult for a voter to express individual preferences for candidates outside his own party. Moreover, the voter received his ballot within a few feet of the polls, and coercion and bribery were common.

To correct these evils, the adoption of the Australian ballot system was seriously urged about 1885 (for details see AUSTRALIAN BALLOT). This system, which provides for an official printed ballot supplied by state or local authorities and insures the voter absolute secrecy in his

balloting, was first used in the commonwealth of South Australia in 1857. It was officially adopted in England in 1872, and was soon after introduced into Canada. The first complete law for the adoption of the Australian ballot passed by an American state was enacted by the legislature of Massachusetts in 1888, and the other states gradually fell into line in the matter of electoral reform, until now the Australian ballot system is used in every state in the Union.

This is, however, not the end of ballot reform. The large number of officials chosen at one time in American elections has necessitated the printing of huge tickets sometimes two or three feet long, and these are often so complicated that the inexperienced or illiterate voter is quite unable to give an intelligent expression of his preferences. There is now a widespread movement for the simplifying of the election ballot; the various measures proposed are discussed in the article SHORT BALLOT.

Ancient Customs of Balloting. In ancient Athens the judges of the highest court generally gave their verdict by dropping stone or metal balls into boxes selected for that purpose. Those pierced in the center, or colored black, stood for a verdict of condemnation, while the unpierced, or white balls, meant acquittal. Shells with marks (*ostrakon*) were also employed, and their use in popular elections gave rise to the institution of *ostracism* (which see), by which citizens who were considered dangerous to the welfare of the state were driven into exile. The Romans generally used wooden tickets (*tabellae*); when a change in law was proposed those in favor marked the ballot with the letters *U R* (for *Uti rogas,* meaning *as you ask*); a vote against the change was indicated by the letter *A* (for *Antiquo,* meaning *for the old*). In an election of candidates for public office the names of the candidates were written on the ballots. These customs of secret voting continued into the Middle Ages. E.D.F.

BALM, *bahm,* a tall, showy and fragrant plant of the mint family, growing wild in the damp and shady woodlands of the southeastern part of the United States, Southern Europe and Western Asia. It is cultivated in gardens as a honey-producing plant and seasoning herb. A common medicine was once made from its leaves and stem, which were cut for this purpose before the appearance of the flower. In different localities the plant is known as *horsemint, bee balm* and *Oswego tea,* and it is often confused with a common variety of catnip, which has a similar odor. When dried the plant has a delightful, lasting fragrance. The *bastard balm,* a native of Southern England and many parts of Europe, is a beautiful plant. *Moldavia balm* is a native of Eastern Europe and Siberia.

Balm of Gilead, the gum or resin from a tree found in Southern Syria and Northeast Africa. The balm of Gilead of the shops, or balsam of Mecca or of Syria, is obtained by making an incision in the trunk of the tree. The gum has a yellowish or greenish color, a warm, bitterish, biting taste and a sharp, fragrant smell. It is valued for its fragrance and its supposed medicinal powers. The name originated from the Scriptures. The word balm is now more often used to signify anything which heals.

BALSAM, *bawl' sam,* the name given somewhat generally to a resinous, spicy substance secreted by certain plants. In North America the valuable *Canada balsam,* a secretion of the balsam fir, is most familiar, but technically the balsams of Peru have the best right to the name. These are of considerable importance commercially, as they are used in perfumery, in confectionery and in medicine, chiefly in the manufacture of lozenges for throat troubles. Balsams are either solid or liquid, and are soluble in alcohol and in ether.

BALTIC, *bawl' tik,* **SEA,** an inland sea of Northern Europe, of great commercial importance, affording Russia its principal outlet to the North Sea and the Atlantic Ocean. It forms part of the coastline of Denmark, Germany, Sweden and Russia, and covers about 160,000 square miles, a little more than the area of the state of California. Its greatest length is about 950 miles—farther than the distance from New York to Chicago; the greatest

LOCATION OF BALTIC SEA

width is 400 miles. Including gulfs and bays, its coastline measures nearly 5,000 miles. Extensions are formed on the north and east by the gulfs of Riga, Finland and Bothnia.

More than 250 rivers flow into the Baltic; this fact, in connection with its small outlet, makes its water much less salt than that of the ocean. The narrow straits of the Great Belt, Little Belt, the Sound, the Skagerrack and Cattegat give access to the ocean, and the Kiel Canal connects the Baltic and the North Sea. A chain of islands guards the entrance to the Gulf of Riga and the Aland Archipelago forms a barrier across the mouth of the Gulf of Bothnia. The trade of the Baltic is considerable but is interrupted in its northern portions by ice during winter. The principal harbors are at Copenhagen, Kiel, Danzig, Memel, Riga, Kronstadt and Stockholm.

At the opening of the War of the Nations in 1914, the Baltic Sea became the scene of a struggle between the German and Russian navies. The port of Riga was heavily bombarded by the Germans in August, 1915, but it was not captured until 1918.

BALTIMORE, Sir George Calvert, Lord (1580-1632), an English statesman, to whom King Charles I granted the right to found the colony of Maryland. He became secretary of state to James I in 1619, but six years later, having declared himself a Roman Catholic, resigned his position and thereafter gave all of his attention to the work of colonizing in the New World. It was Lord Baltimore's desire to establish a colony where his Roman Catholic countrymen would be free from persecution. He had founded a small settlement in Newfoundland in 1621, but the unfavorable climate led him to give up the enterprise. Charles I, who came to the throne in 1625, was friendly to him, and in 1631 granted him a tract of land in Virginia north and east of the Potomac. Before the charter was signed, Lord Baltimore died, and the charter rights passed to his son Cecilius Calvert, the second Lord Baltimore, who founded the colony that was named Maryland in honor of Henrietta Maria, queen of Charles I. The successes and discouragements that beset the new colony are told in the article Maryland.

BALTIMORE, Md., the largest city of the state and the eighth city in the United States in population. It is noted as a great commercial and industrial center, as an important seaport and coaling station, and as the leading oyster market in the world. It is situated in the north central part of the state, at the head of navigation on the Patapsco River, fourteen miles from Chesapeake Bay. Washington, D. C., is thirty-eight miles southwest, and Philadelphia is ninety-seven miles northeast. Below the city the river widens sufficiently to form a harbor and an outer bay beyond, which are capable of accommodating the largest ocean steamships. This port is regularly visited by nineteen steamship lines, including trans-Atlantic lines. There is an extensive coastwise trade, and bay craft of many kinds bring to the city large quantities of sea food and fruits. Railway transportation is provided by the Pennsylvania; Baltimore & Ohio; Western Maryland; Maryland & Pennsylvania; and Maryland, Delaware & Virginia railroads. In common with most seaports, Baltimore has a mixed population, which increased from 558,485 in 1910 to 733,826 in 1920. Negroes comprise about one-sixth of this number; Germans and Irish predominate in the foreign element.

Location. The city is irregularly divided by Jones' Falls, a stream which has its source at springs twenty miles north and flows 500,000 gallons per day. The construction of more than twenty arches across this stream in the city proper has converted it into a highway called the Fallsway. One of these, constructed of white marble, between the stations of the Pennsylvania Railway and the Baltimore & Ohio, is a beautiful engineering triumph. The section east of the Falls along the harbor con-

tains wharves, factories and canneries. An irregular strip extending southeast from the Falls is known as Locust Point, and here are located immense wharves and railroad terminals, mammoth grain elevators and some of the largest coal piers in the world. Fort McHenry protects the harbor. North of the harbor lies the wholesale section; extending beyond this toward the west is the retail district, and still farther on lies the most desirable residential locality. Beyond the city to the north and northwest is a rapidly-growing, attractive district easily reached by electric lines; Roland Park, Mount Washington, Forest Park and Arlington are the largest of these suburbs.

Parks and Boulevards. Of the city's many delightful parks and squares, well distributed over its area, Druid Hill Park is the most famous. It covers 674 acres of natural beauty, and may reasonably be ranked with the finest parks in the United States. Druid Lake is a large, artificial basin, and is part of the city's waterworks system; the park contains statues of Christopher Columbus (erected in 1792), Sir William Wallace and George Washington. Other parks worthy of mention are Gwynn's Falls (375 acres), Clifton (267 acres), Wyman, Carroll, Riverside, Swan and Patterson parks; Federal Hill, which overlooks the fine harbor, contains several guns used in the War of 1812. These with the numerous squares scattered throughout the city comprise a park reservation exceeding 1,400 acres. Green Mount is the most beautiful of the city cemeteries, and Baltimore Cemetery is the largest. Westminster Cemetery, one of the oldest and smallest, is the burial place of Edgar Allen Poe.

Charles Street Boulevard is a wide parkway leading to a handsome residential district, and Mount Vernon Place, with its famous Washington Monument, is considered one of the most beautiful residential streets in the Union. The Washington Monument, 164 feet high, erected in 1815, was the first memorial by any city or state to the illustrious American; Battle Monument, in Monument Square, scarcely less conspicuous, was erected to the memory of the defenders of North Point in the War of 1812. To Washington and Battle monuments rather than to the great number of monuments adorning the parks and squares, the city owes its popular name, *The Monumental City*. The Wells, McComas, Armistead, Taney, Wildey, Howard, Ridgely, Confederate, and Soldiers' and Sailors' monuments and several bronzes in Mount Vernon Place are all works of artistic merit. In memory of Francis Scott Key, who wrote *The Star Spangled Banner* in Baltimore, the city has erected a most striking monument surmounted by a figure of Columbia guarding a flag.

Buildings and Churches. Solidity is the first impression given by the architecture of Baltimore. The most notable of the public buildings are the $2,750,000 white marble courthouse, the city hall, which cost $2,271,000, and the Federal building, the construction of which cost over $1,500,000. The city jail, Johns Hopkins Hospital, one of the largest and best-equipped hospitals in the world, the Baltimore & Ohio and the Pennsylvania railway stations, the Y. M. C. A. building, the Armory and Walter's Art Gallery are all structures above the average of their kind. All denominations are represented in the city's churches, which number nearly 500; the most prominent are the massive Roman Catholic Cathedral, built in 1800 and containing valuable paintings and works of art; the Methodist Episcopal Church, which was the first of this denomination founded in the United States; First Presbyterian Church, Jewish Synagogue, Har Sinai Temple, Saint Paul's, Grace, and Christian Science churches. Baltimore is the see of a Protestant Episcopal bishop and of a Roman Catholic cardinal (Cardinal Gibbons), whose diocese is the first in the United States.

Institutions. Johns Hopkins University, one of the world's great educational institutions, was opened in 1876. Peabody Institute, with its vast library, art gallery and conservatory of music; the Woman's College (Methodist Episcopal), Saint Mary's Seminary of Saint Sulspice, Loyola College, Saint Joseph's Seminary (colored), Morgan College (colored), McDonough School, Bryn Mawr School, Visitation, Notre Dame of Maryland, and Mount De Sales academies are institutions of high rank. Professional schools include the Polytechnic Institute; the law and medical departments of the University of Maryland; Baltimore Medical College; Baltimore College of Dental Surgery, the oldest of its kind in the United States (1839); Maryland College of Pharmacy, and the College of Physicians and Surgeons. In addition to the public libraries, the joint gift of Enoch Pratt, the city and Andrew Carnegie, there are the libraries of the Maryland Institute and Maryland Historical Society, the Baltimore Bar Library, the Maryland Diocesan Library, the New

Mercantile Library and the libraries connected with the various educational institutions. Besides Johns Hopkins Hospital, the city has Maryland Hospital for the Insane and Springfield State Hospital. There are homes for aged men, for boys, for young women, asylums for orphans, an association for improving the condition of poor children, an asylum for the blind and an almshouse. See JOHNS HOPKINS UNIVERSITY.

Commerce and Industry. Although Baltimore is industrially the youngest of the great Atlantic coast cities, it has for many years been a prominent seaport, its fame in earlier days being carried far by the world-renowned "Baltimore clippers," a picturesque sea-craft no longer in use. One of the largest floating dry-docks in the world, the "Dewey," was constructed here in 1905. Baltimore is the center of an immense import and export trade, owing to its nearness to agricultural, coal and mineral wealth and its facilities for shipment, anchorage and dockage. It is the largest corn-exporting port in the Union, and it sends out enormous quantities of other grain, coal, provisions, live-stock, and tobacco; next to New York it is the largest grain market on the Atlantic coast. Cotton, fruits (chiefly bananas), iron and copper ores are the principal imports. The freight handled annually is estimated at 48,000,000 tons.

As a manufacturing center the city is rapidly forging ahead, making almost every commodity known to trade. Its largest single product is that of men's clothing; the allied copper, tin and sheet-iron products rank second. It has one of the largest copper-refining plants in the United States, and the Bessemer Steel Works at Sparrow's Point have a daily capacity of 2,000 tons. Baltimore leads the other great cities in making cotton duck, straw goods and fertilizers, and in canning oysters and fruits; the cotton-duck mills here produce three-fourths of the sail-duck made in the United States. Shipbuilding, slaughtering and meat packing, printing and publishing are important industries. The city has more than 1,000 wholesale houses, and the jobbing trade, exclusive of the commission business, amounts to $250,000,000 annually.

History. The city was named in honor of Cecilius Calvert, second Lord Baltimore, who founded the colony of Maryland. The town was settled in 1730. In 1732 Jones' Town, on the opposite side of the stream was settled, and in 1745 the two were consolidated. Originally the city was included in Baltimore County, of which it became the county seat in 1767; later, city and county were separated, and at the present time Baltimore has a government independent of the county. During the Revolutionary War the city for two months was the seat of government, when the Continental Congress was forced by the British to retire from Philadelphia. Since 1780 it has been a port of entry, and since 1796, when it united with Fell's Point, it has been an incorporated city. In September, 1814, it repulsed two attacks by the British, in the battle of North Point and the bombardment of Fort McHenry. In Baltimore, April 19, 1861, was shed the first blood of the War of Secession, when Union troops, passing through the city in response to Lincoln's call for volunteers, were attacked by citizens; the city remained under martial law until the close of the war. In 1888 and in 1890 the area of the city was considerably enlarged by the annexation of adjoining territory.

On Sunday, February 7, 1904, the city was visited by a great fire, which continued for two days and required the combined efforts of sixty-two fire companies to extinguish it. The entire business district was destroyed, the loss being estimated at $125,000,000. Later, the fire was regarded as a blessing rather than a disaster, as this section arose from the ashes in new buildings of the most modern type. Baltimore was the first city in the country to illuminate its streets by gas (1821); the first steam passenger train in the United States was operated on the Baltimore & Ohio Railway from this point to Ellicott Mills (fifteen miles). To Baltimore from Washington was strung the first telegraph line, and here the first telegraphic message was received, on May 24, 1844. A.S.G.

BALTIMORE ORIOLE, HANGBIRD, FIREBIRD or **GOLDEN ROBIN,** an interesting song-bird that nests in the Northern United States and Southern Canada, known for its splendid plumage and musical whistle, and, above all, for its remarkable skill in nest building. The nest, formed like a long, slender purse, from six to eight inches deep, is woven onto the limb of a tree which has long, drooping branches, the elm and the weeping willow being favorites, and hangs at some distance from the ground, protected from sun and rain by the overspreading leaves. The materials used are principally grass, strips of bark, strings, hair and vegetable fibers. The eggs, four to six

in number, are less than an inch long, and are dull white, with irregular, dark-brown blotches.

THE NEST

The male bird is a handsome creature from seven to eight inches long, with glossy-black head and upper parts, white-tipped wings and brilliant orange under parts. The female is a little smaller than her mate and paler in color, with the black sometimes replaced by olive-brown or grayish-orange. These birds feed on small caterpillars, certain kinds of beetles and small flies, and as they seldom disturb any of the garden fruits they are harmless as well as useful. They are cheerful and playful when placed in cages, and make interesting pets. The Baltimore oriole winters in Central America. Linnaeus, who obtained his first specimen from Maryland, gave the name *Baltimore oriole* to the bird, as a compliment to Lord Baltimore, proprietor of the colony, because his colors, like the birds, were orange and black.

BALUCHISTAN, *ba lu chi stahn',* a semi-independent country of Asia, which has so few desirable features to offset its disadvantages that in 1921 it had an average population of only six to the square mile—421,679 inhabitants to its 54,228 square miles of territory. From its southern boundary, where it meets the Arabian Sea in a steep, inhospitable shore line, to the borders of Afghanistan on the north, it is rocky, dry and desolate. Mountain chains, some of them attaining a height of from 10,000 to 12,000 feet, are found everywhere except in the northwest, where stretch wide plains of mingled stone and sand. Several short rivers start from the north toward the sea, but few of them finish their course, for unless they sink into the sand and disappear they are drawn off for irrigating purposes, for Baluchistan has very little rain. Some districts average only five inches a year, and even the most primitive agriculture cannot be carried on without some irrigation. Where this can be practiced, grains, cotton, indigo and various fruits will grow, and the date palm, as in so many dry countries, is a staple product.

LOCATION OF BALUCHISTAN

The People, Their Life and History. Two races live in Baluchistan—the *Baluchis,* for whom the state is named, and the *Brahnis.* The former are Aryans, and related to the peoples of India and Persia, but of the race connections of the latter nothing has been learned. Scarcely any of the people can be considered more than partly civilized, and the large proportion of the inhabitants who roam the deserts with their goats, sheep and camels, are very primitive in their methods of life. (See NOMAD LIFE.) In religion, practically all are Mohammedans.

Government and History. The history of this barren and uninviting country previous to the time that Europeans began to interest themselves in Southern Asia, is little known. A member of the Persian ruling house established himself firmly about the middle of the eighteenth century, and made the various tribal chiefs acknowledge the supremacy of the khan, or king, of Khelat. Because this ruler opposed Great Britain during the Afghan War, a force of British soldiers entered the country in 1839; fifteen years later Great Britain acquired a protectorate over the entire state, the khan of Khelat receiving each year a subsidy from the British government. From Quetta, their capital, the British control much of the country, but the semi-independent tribes still acknowledge the hazy supremacy of the khan, who rules from Khelat. Diplomatically the country is titled a British Political Agency.

BALZAC, *bal zak',* HONORÉ DE (1799-1850), the foremost of French novelists, whose *Eugénie Grandet* is considered by some critics the greatest novel ever written. This is not because it has an absorbingly interesting plot, for the story is a simple one, with no exciting incidents; nor yet because its pen pictures are beautiful or unusual, for the setting is a dull, bleak old house in a village street; but the character-drawing is masterly. Nowhere else in literature is there such a study

of avarice as the old Monsieur Grandet presents, and the other characters grouped around him show equal skill in pen portraiture. Had Balzac written but this one novel, he would still stand in the first rank as an interpreter of human nature.

BALZAC

Balzac was born at Tours, on May 16, 1799, of a family which could lay no claim to rank or to intellectual distinction. He himself showed no sign of unusual ability in his somewhat neglected youth, and was much more fond of playing truant and of wandering about the country than of studying. Though educated for the law, he firmly refused to practice and held true to his desire to live by his pen. His family could give him no financial aid, and the public paid little or no attention to his early novels; but he persisted, and in 1829, with the publication of *The Chouans,* it became evident that he was a writer of real genius. Not content with simply turning out one novel after another, planlessly, he formed for himself a vast design, so ambitious that a long lifetime would have been all insufficient for carrying it out. This was no less than the writing of a series of novels, under the general title of *The Human Comedy,* which should picture every phase of human life in the France of his day.

His plan was left incomplete at his death, but it had resulted in an astonishing number of novels, containing those marvelous character-delineations which entitle him to rank next below Shakespeare in his power to describe men's character. The person who reads any considerable number of his books is conscious of a longing for more "sweetness and light," for he does not hesitate to introduce the most sordid and even vicious of characters and happenings; but with all of this he keeps his emphasis true, and makes the better and more ideal aspects of life the more attractive. The best of his novels, in addition to the one mentioned above, are considered to be *Old Gariot,* a study of a father's self-sacrificing and unrepaid devotion to his daughters; *Cousin Betty,* which treats of the love of a niece and an aunt for the same man; *Cousin Pons,* which has as its theme the poor relation who has outstayed his welcome; and *Lost Illusions,* a long, complicated tale of Parisian life, with emphasis on its baser elements.

During the latter part of his life Balzac was much under the influence of Madame Hanska, a Polish lady with whom he was in love, and this intense emotion interfered considerably with his work. Only a few months before his death he married her. A.MC C.

BAMBOO′, the popular name for the giant, tree-like grasses of the tropics and adjacent regions, the uses of which are exceedingly numerous. There are about 200 species, found in Asia, America and Africa, varying in height from a few feet to 120 feet. The largest bamboo trees are sometimes three feet around. The stem of the bamboo, like that of other grasses, is jointed, and springs from a jointed, underground rootstock. The plant usually grows tall and erect, reaching its full height before putting forth branches, when the horizontal limbs appear, forming a dense thicket near the top of the stem. The flowers hang in large clusters, some species blossoming every year, others only once in many years. The bamboo stem, hard, light, elastic and hollow, is the most interesting and useful part of this plant.

BAMBOO TREES

Uses. The bamboo rivals the palm in usefulness, and serves the people of Malay, India, Ceylon, China, Japan and the Philippines in innumerable ways. The bamboo wood, split up, is made into floors, or rafters in dwelling houses; sections of the stem form posts or columns. Often the entire roof is made of bamboo wood. The Japanese have forests of these trees, which they cultivate for building purposes. Travelers in Japan tell of the most

charming bamboo greenhouses, and of bamboo stems used as waterpipes in connection with bath houses. The outer layer of the stem the Japanese cut into thin strips to be used in basket making, and the bamboo fibers are employed in the manufacture of paper.

The Chinese have bamboo beds, couches, chairs, tables and stools; children in China play with bamboo toys, the workman uses tools with bamboo handles, and the boatman has bamboo ribs for the sails of his ship. Bamboo

SOME USES OF BAMBOO

The building, the pier, and even the boat, are made from the indispensable bamboo.

cooking utensils, life-preservers, bows, arrows, quivers, fishing rods, mats, canes, musical instruments, fans, parasols, pipes and playing cards are other examples of the extreme usefulness of this interesting plant.

The grains of the bamboo are valued as food, and in China they take the place of rice when the crop of the latter fails. The young shoots of some species are pickled in vinegar and are sometimes cooked like asparagus. The bamboo also has ornamental qualities, and some of the hardier varieties are cultivated in England and the United States in landscape gardens and greenhouses. B.M.W.

BAN, a word with an interesting history and a variety of meanings, used at the present time in the sense of *to prohibit* or *condemn.* Thus, a person who has rude, coarse manners is said to be *banned* by society, or to be *under its ban.* In its earliest use ban meant a *proclamation,* and also the fine imposed for disobeying it. Later, in France, the term was applied to a summons to arms, and from this, to the vassals of the king who were called upon to perform military service. During the Middle Ages a person under the ban was one who had been outlawed, and this expression was also applied to the outlawing of entire cities. In the history of the Church those who suffered excommunication were said to be *under the Papal ban.* In the course of time ban came to be used in the sense of *curse,* and so occurs in *Hamlet:*

> With Hecate's *ban* thrice blasted, thrice infected.

The earliest meaning of the word, that is, a *proclamation,* survives in the expression *banns of marriage* (which see).

BANANA, *ba nah' na* or *ba nan' a,* is the name borne by a tropical fruit which is now relished the world over, though scarcely known as late as 1870. To say that the great heavy bunches of bananas which are so familiar a sight in the markets do not grow on trees, but upon herbs, sounds at first absurd and impossible. It is, however, the truth, but in the tropics herbs grow to such great size that they would not be recognized as such by people in temperate regions.

How It Grows. The banana has an underground stem which sends up suckers or sprouts that attain their full growth in a year and a half or two years (see PERENNIAL). Its "trunk" is not really a trunk at all, but a false stalk formed by the curled bases of the leaves, which wrap themselves about the flower stem. This stalk, almost a foot in diameter at the bottom, rises to a height of from ten to forty feet, its great leaves, a foot or two in width and from six to ten feet in length, drooping outward. When the plant has reached its full growth

HOW BANANAS GROW

At left is shown an opening flower.

there appears a huge flower bud, which opens and shows a bunch of little purple flowers, each of which makes way for a tiny banana. The great flower cluster hangs toward the earth, but as the separate fruits begin to grow they

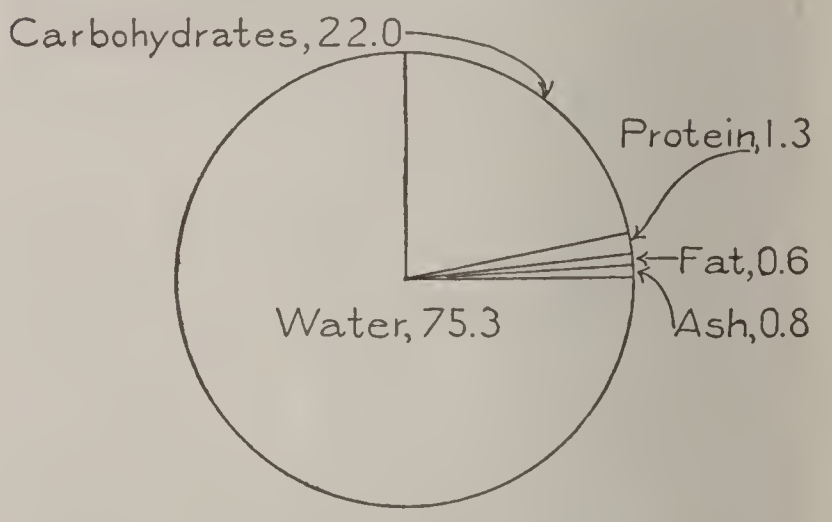
turn upward. From 50 to 150 bananas, weighing altogether from 40 to 100 pounds, may grow in a bunch, and their lower ends point upward. A bunch of bananas as displayed in a store is hung bottom side up.

The Banana Industry. The banana thrives in a hot, moist climate, and is raised in the tropical regions of both the Eastern and the Western hemispheres. In the Americas it grows on most of the West India islands and along the coasts of the Gulf of Mexico and the Caribbean Sea, from Vera Cruz to the mouths of the Amazon River. California, Florida and Louisiana produce a small crop. The greatest banana section in the world is in Central America, although there are single groves in Colombia containing 100,000 acres.

Bananas are imported in great quantities by the countries of Europe and temperate North America. The people of the United States and Canada alone consume about 50,000,000 bunches of the fruit a year, but the development of the American industry is comparatively of recent date. In the year 1866 a small cargo of bananas, raised on plantations in Northwestern Colombia, near the present Panama Canal Zone, was delivered at the port of New York. This was the beginning of the banana industry in the United States and Canada. In the early days of the industry the individual fruits sold for about ten cents each, or fifty cents per half dozen. It is a remarkable fact that the banana has maintained its present reasonable price of from ten to twenty-five cents per dozen throughout the era of high food values. It is one of the few commodities in common use for which the consumer has not had to pay double and treble the price demanded a few years ago. This is due to the scientific methods of production and marketing adopted by the companies which handle the trade. Bananas from the American tropics have been imported into Great Britain and the continental European countries since 1903.

Uses. For the most part the fruit is the only portion of the banana plant used, and the leaves and stalks, which must be cut down after the fruit has matured, are thrown away. Some species, however, produce a useful fiber, and the leaves of certain kinds are used for roofing houses and to make mats, bags and baskets. Dwarf varieties of the plant are sometimes raised for ornamental purposes.

Food Value. The uncooked banana is most wholesome and nutritious when the peel is of a yellow-brown color. The fruit is brought to Northern markets green and is ripened artificially. An unripe banana contains a large proportion of starch, which changes into sugar in the process of ripening. An uncooked green banana is as hard to digest as a raw potato. When cooked, however, the fruit becomes readily digestible, and many delicious dishes are prepared by the natives in banana countries by baking the green fruit in hot ashes. In countries which depend upon importations cooked bananas are also finding favor; they are fried, made into croquettes or fritters, cooked with ham or bacon, and prepared in other ways. For cooking purposes it is always preferable to use unripened fruit. Banana flour, which is a common article of diet in the tropics, is coming elsewhere into use. It is made by grinding the dried, unripened fruit. It has been estimated that one pound of banana flour is equal in nourishment to two pounds of wheat flour, and it has been found of special value as an ingredient of milk mixtures for infants.



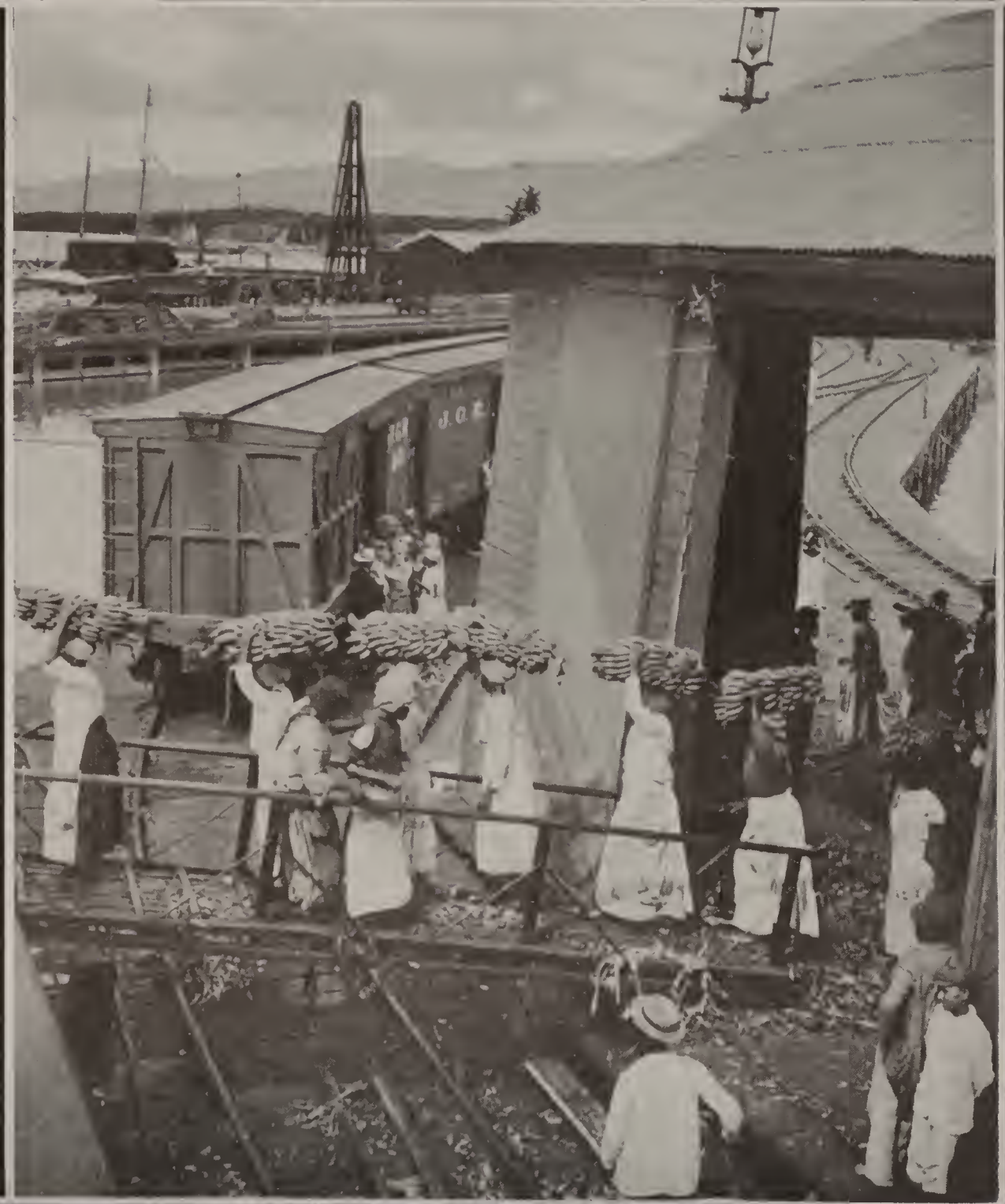
FOOD VALUE

Three-fourths of the edible part of the banana is water.

The banana is the only sweet fruit which can be obtained fresh and in a good condition in all parts of a country and at all seasons. It has the further advantage of being put up by Nature in a germ-proof package, for its inedible peel constitutes an air-tight protection against every form of germ or dirt. The following figures show the average composition of the fruit: water, 75.3 per cent; protein, 1.3; fat, .6; carbohydrates (starch and sugar), 22; ash, .8. Its water content is lower than that of apples and oranges, but it is superior to either of these fruits in actual nutritive value. Its energy value is 460 calories per pound (see CALORIE; FOOD, subhead *Chemistry of*), as compared with 465 calories for green peas. In the words of a leading medical authority, the banana is a "fruit-food, containing in an agreeable form all of the elements of nutrition." B.M.W.

HOW BANANAS GROW.

When we see bananas in the store with the fruit hanging downward we naturally infer they grow that way. The illustration shows our error



THE BANANA INDUSTRY.

At left: Shipping station on a great plantation in Costa Rica. At right: Women are employed almost exclusively in loading vessels in Jamaica.

BANCROFT, GEORGE (1800-1891), an American historian whose best-known production, a history of the United States, is a standard work on that subject. He was born at Worcester, Mass. After his graduation from Harvard College in 1817, he went abroad and devoted several years to the study of history and philology in Germany and to travel elsewhere in Europe. On his return to America, in 1822, he became a teacher of Greek in Harvard, but feeling restricted by the conventional atmosphere of the Cambridge school, he joined a friend in the organization of a high school at Northampton, Mass. While teaching in this school he was elected to the state legislature on the Democratic ticket, but declined to serve.

GEORGE BANCROFT

He had become well known in Democratic politics by the time of Martin Van Buren's election to the Presidency (1836), and was appointed by that official, collector of the port of Boston. Nathaniel Hawthorne was one of his appointees while he was filling this position. Bancroft became President Polk's Secretary of the Navy in 1845, and served until 1846, when he was sent as minister to London. For a short period in 1846 he also acted as Secretary of War. During the time he was in the Cabinet he lent his influence toward the establishment of the Naval Academy at Annapolis and had much to do with shaping its policies. In the same administration, while acting as temporary Secretary of War, he gave the order for the American forces to march into Texas (see MEXICAN WAR).

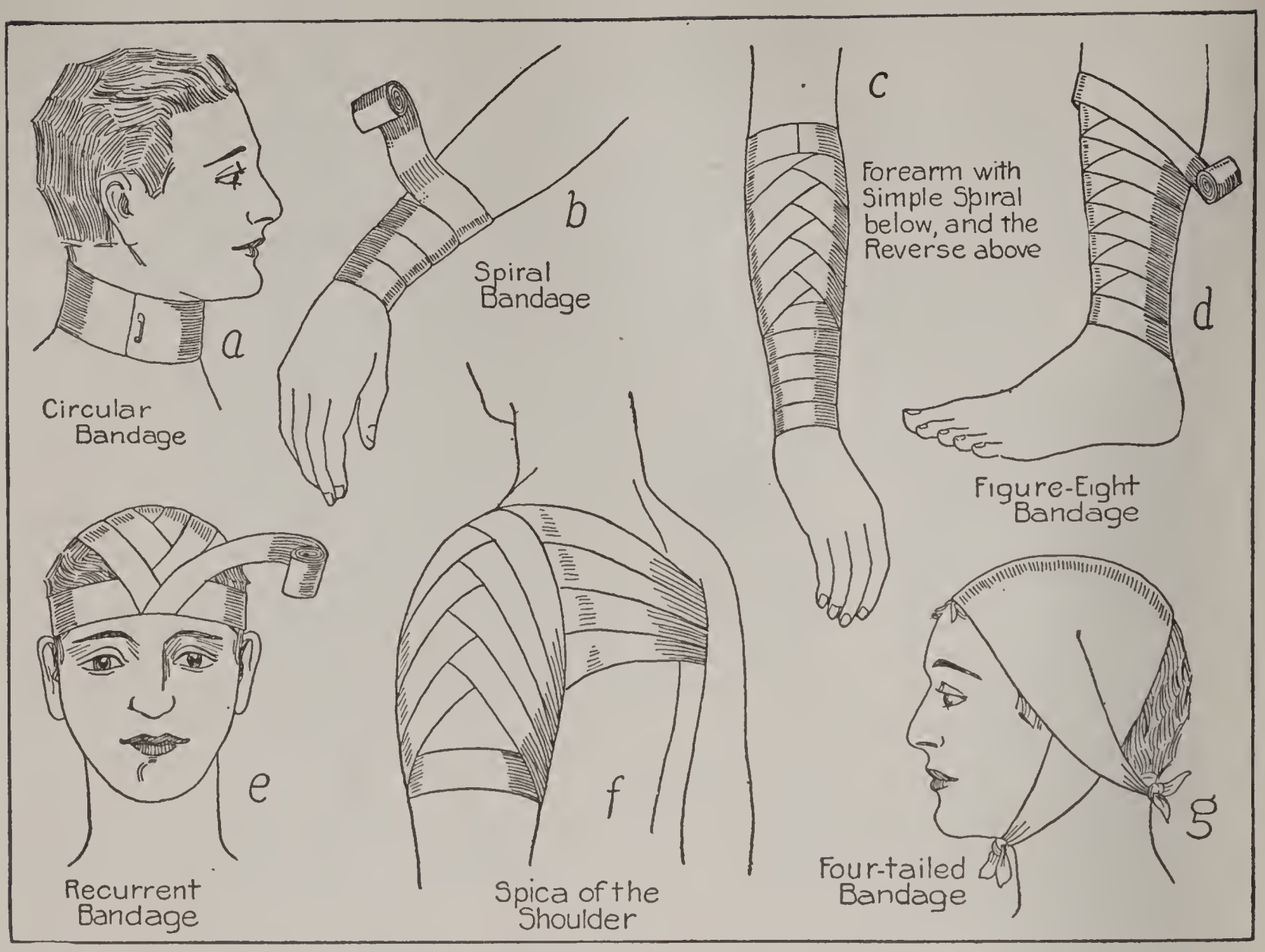
Bancroft's first published work was a collection of poems and translations, issued in 1823, and from that time on he gave much of his energies to writing. The first volume of his *History of the United States* was published in 1834, and at intervals other volumes were issued, the last revised edition of the completed work appearing in 1884-1885. This work stamps him as one of America's leading historians, and reveals painstaking preparation, breadth of scholarship and imaginative insight into the affairs of nations. He was also the author of numerous orations and political addresses and magazine articles. His services to his country continued into his latter years, for he was selected by Congress in 1866 to deliver a special oration in honor of Lincoln, and in 1871 was appointed minister to the new German Empire. On April 27, 1886, he delivered at Washington, D. C., his last public oration.

BANCROFT, HUBERT HOWE (1832-1918), an American historian, whose voluminous *History of the Pacific States* represents a collection of manuscripts, pamphlets and books to the number of 60,000. He was born at Granville, O., and in 1852 went to San Francisco, where he became a bookseller. His deep interest in the history of the Pacific coast region led him to devote himself to the work of compiling a complete and original history of the Pacific states, and the results of his labors, begun in 1856, were turned over to the University of California in 1905. Some of the material was dictated to him by prominent pioneers of the West. Bancroft is also the author of the *West American Historical Series,* in thirty-nine volumes. His latest writings include *The Book of Wealth,* and *Retrospection, Personal and Political.*

BAND, a combination of musical instruments that may be played in harmony, comprising drums and such wind instruments as can be played while the players are marching. In theory, no device that cannot be carried by a man on foot can enter into a grouping of band instruments, although in the development of this kind of music many great bands now seldom play except when seated, and some of these have added several instruments too cumbersome to carry.

There had been no attempt at musical organization of any kind until after the middle of the thirteenth century, when wandering pipers and trumpeters joined together in guilds. The first of these was probably that of the Brotherhood of Saint Nicholas, organized in 1228 in Vienna. From these guilds town bands developed throughout Germany and Austria, in which the trumpets and kettledrums were reserved only for the nobility. At first these musicians played no written music, in order to make their order seem more secret, but at the close of the seventeenth century their music began to be noted down and its monotony was relieved by the introduction of trumpets tuned in other keys.

In addition to the *fife and drum corps* which is a popular form of band in America, bands



VARIOUS FORMS OF BANDAGES

are chiefly of two types—*brass bands* and *military bands.* The former, in addition to bass and snare drums, have only cornets and trombones, while the latter have other wind instruments as well—clarinet, piccolo, flute, oboe and saxophone. The military band is therefore able to achieve a far wider range of effects, and the brass band is generally made use of only where no band of the military type is available.

Military Bands. As the name strictly implies, military bands are connected with a military body, such as an infantry or cavalry regiment, but the term has been broadened to include citizen organizations that have adopted the instruments named above which distinguish the military from the brass band. A number of military bands in America have had noteworthy careers as concert bands, and have fallen not far behind orchestras in the enthusiasm which they have aroused. In the United States Patrick Sarsfield Gilmore had more to do than any other one man with the increased efficiency and popularity of military bands; and later John Philip Sousa, trained in the United States Marine Band at Washington, the foremost organization of its kind in the United States, came prominently before the public as a leader of concert bands. See Orchestra.

BANDAGE, a covering for an injured part of the body, used to keep dressings on wounds, to apply pressure, to control circulation, to reduce swelling, to prevent movement and to furnish support. Bandages vary in width from one to six inches, and in length from a few inches to several yards, according to the portion of the body for which each is intended. They are made most commonly of gauze, crinoline, muslin, flannel, linen or cheesecloth. Rubber bandages are used as a means of support in the treatment of weak ankles and varicose veins, and to check hemorrhage. There are five fundamental bandages, on which a large number of special bandages are based. These are the *circular,* the *spiral,* the *spiral reverse,* the *figure 8* and the *recurrent.*

The first, and the simplest, consists of two or three circular turns, each of which covers the preceding one, as shown in diagram *a.* The spiral bandage is wound around the limb in a series of oblique turns, so that each turn overlaps the previous one about one-half its width (see diagram *b*). The spiral reverse is an ordinary spiral bandage with reverse folds.

That is, the bandage is doubled back upon itself when it is necessary to adjust it to the enlarging or tapering parts of the limb (see diagram *c*).

A figure 8 bandage, the turns of which cross each other in such a manner as to resemble the figure 8, is sometimes used instead of the reverse spiral in bandaging the extremities, and is especially valuable in giving support to the joints. Diagram *d* shows a figure 8 bandage applied to the lower part of the leg. The recurrent bandage is one in which a series of turns are passed back and forth across the injured part, each turn overlapping the other one-half its width, and the ends being secured by a circular turn around them. This form of bandage is used chiefly in keeping dressings in place on the ends of the fingers and toes and on the head (see diagram *e*).

Important among the special bandages is the *spica,* which is based on the figure 8. This is a bandage which passes successive turns and crosses from an extremity to the trunk, as shown in diagram *f*. It receives its name from its resemblance to a spike of barley. The four-tailed is a special bandage extremely useful in keeping poultices in place; diagram *g* shows such a bandage applied to the head. This consists of a piece of cloth eight inches wide, and long enough to go over the scalp and tie beneath the chin. It is cut in the middle from each end to within four or five inches of the center, two ends being tied under the chin and two behind the neck.

The soldiers of the German army are provided with packets containing large handkerchiefs which are used in cases of emergency as triangular bandages or slings, and also as short spiral bandages when folded lengthwise. These are also carried by members of ambulance corps and "first-aid-to-the-injured" societies. B.M.W.

BANDICOOT, *ban'di koot,* a curious animal common in Australia, combining some of the characteristics of the kangaroo, rabbit and rat. It has ears like a rabbit, tail like a rat and, like the kangaroo, the female has a pouch in which the young are carried. It feeds on vegetables and insects and does great damage to gardens and growing crops. In some parts of Australia it is called the *native rabbit.*

BANDICOOT

Bandicoot Rat. This is the largest known species of rat, often exceeding a foot in length, It is a native of India and Ceylon, in which countries its flesh is considered a great delicacy. When roasted, it resembles young pork. The bandicoot rat does not hibernate, but considerable stores of rice and other grain have been found in its burrows. Feeding only at night, it lives on vegetables, grains and roots, and is very destructive to gardens.

BANDIT, or **BRIGAND,** *brig' and,* one of a band of robbers or highwaymen living in secluded spots or in mountains, around some of whom many thrilling tales have been woven. Because of the violent, plundering ways of the hired soldiers who held the city of Paris in 1358, during the imprisonment of King John, the name was first applied to them.

Robin Hood, the gallant, liberal, reverent outlaw of song and story is the most celebrated brigand in British history. Later came Dick Turpin, the cattle thief. For years, in Germany, the so-called robber barons held the southern part of the country at their mercy. Spain has always been a particularly favorable field for bandits. Don José Maria, a principal character in Merimee's *Carmen,* is probably the most famous. In Italy, Fra Diavolo, the cruel bandit monk, practiced his profession. In recent times brigandage has taken the form of kidnaping and holding for ransom. In 1901 Miss Ellen Stone and her companion were kidnaped in Macedonia; the United States paid the ransom for their release. It is now plain that these brigands were the close allies, if not the paid agents, of the famous Macedonian committee, which is seeking to secure the independence of the country, and used this method of securing funds.

In the United States and Canada brigandage has taken the form chiefly of train and stage coach robberies, especially in the passes of the Rocky Mountains. The most famous of all American brigands was Jesse James, the daring central figure of many stories for boys. See Robin Hood.

BANFF, *banf,* Alta., one of the most famous summer and winter resorts in America. It lies at an altitude of 4,500 feet, at the southeastern end of Rocky Mountains Park, and is visited each year by thousands of tourists who come to see the Canadian Rockies. The scenery in the vicinity of Banff is declared by many critics

to be superior to that of Switzerland; the many points of interest are described in the article ROCKY MOUNTAINS PARK (which see). Banff itself exists only for the entertainment and comfort of tourists. It is unique among Canadian towns in that it has no mayor or aldermen, all control being in the hands of the park superintendent appointed by the Dominion government. All land is owned by the Dominion and is occupied under leaseholds, and all utilities, including water and electric light, are supplied by the government.

Banff was settled in 1893, and was named for the Scotch town from which Baron Mount Stephen came. It is eighty-two miles west of Calgary, on the Canadian Pacific Railway, about 600 miles east of Vancouver, and about fifteen miles east of the boundary between British Columbia and Alberta. Population in 1921, 2,062. The population was considerably decreased in 1914, as about 300 men, nearly one-third of the at that time population, volunteered for service in the War of the Nations. E.S.

BANGALORE, *bang ga lohr'*, a fortified town of Southern India, capital of the state of the same name. It stands on a plateau 3,000 feet above sea level and is one of the most pleasant and healthful stations in British India. The modern portion of the town is well planned, with wide, clean streets and handsome buildings. The palace of the maharaja, the nominal ruler of the state, is a structure of great beauty. There are numerous native and European educational institutions, all well supported. The chief manufactures are silks, cotton cloth, woolens, carpets and gold and silver lace. In the old town stands the fort reconstructed in 1761 and stormed by Lord Cornwallis in 1791. Population in 1911, including the British garrison, 189,485.

BANGKOK, *bang kok'*, a city of islands, canals and floating houses, the capital of the kingdom of Siam. It is situated on both banks of the river Menam, and on islands formed by its numerous branches. There is a regular communication by steamer with Saigon, Hongkong, Shanghai and Singapore. A sea voyage from San Francisco to Bangkok would cover a distance of more than 12,000 miles. It would be necessary to sail first to Honolulu, thence to Hongkong or Singapore, at either of which ports passage may be booked to Bangkok.

A large portion of the population live in floating houses moored in the river, and many houses are built on piles to escape the floods due to the extremely low surface of the land. Bangkok has extensive commerce, but nearly the whole of its domestic and retail business is carried on by Chinese. The exports consist chiefly of rice, sugar, silk, cotton, tobacco, pepper, sesame, ivory, hides and teak. The modern portion of the city has an electric railway system and is illuminated by electric light. Population, 1922, thought to be 931,170.

BANGOR, *ban' gawr,* MAINE, the county seat of Penobscot County, is an important commercial and manufacturing center, 138 miles northeast of Portland. It is in the south central part of the state, sixty miles from the ocean, at the head of navigation on the Penobscot River. The Kenduskeag Stream flows through the city and empties into the Penobscot. Bridges cross both streams; one which is 1,300 feet long and is built over the Penobscot connects Bangor with Brewer. The tide rises seventeen feet in the Penobscot River at this point; there is always sufficient depth for the largest steamers. Bangor is served by the Boston and Bangor division of the Eastern Steamship Line and by the Maine Central and the Bangor & Aroostook railroads, and electric interurban lines. The population in 1910 was 24,803; it increased to 25,948 in 1920. The area exceeds thirty-two square miles.

The business section of the city extends along the banks of the Kenduskeag and the west bank of the Penobscot; the residence section occupies higher ground back from the rivers. Among the prominent buildings are the fine granite custom house and post office, county courthouse, city hall, the Hersey Memorial building, public library, opera house, high school and auditorium (in which is held the annual eastern Maine musical festival). The important institutions of the city are the Bangor Theological Seminary (Congregational), the University of Maine Law School (the state university is located at Orono, nine miles distant), the Bangor State Insane Hospital and the Eastern Maine General Hospital.

Bangor is one of the largest lumber markets in the United States, ships large quantities of ice and has extensive wood-working plants, trunk factories, pulp and paper mills, shoe factories, foundries, machine shops and manufactories of stoves, canoes and moccasins. Bangor has an important foreign trade, the value of which exceeds $4,000,000 a year; the products of its factories in 1920 were valued at $5,500,000. It is the outfitting point for

sportsmen who yearly visit Northern and Eastern Maine.

In his search for the mythical city of Norumbega, whose site Bangor is supposed to occupy, Champlain visited the place in 1604. The first permanent settlement, made in 1769, was called Conduskeag, and was locally known as Sunbury. The name was changed to Bangor, and the town was incorporated in 1791. It became a city in 1834. The first railway in the state, completed in 1836, extended from Bangor to Old Town, and one of the first iron steamships built in the United States ran between this port and Boston. M.W.

BANGS, JOHN KENDRICK (1862-1922), a popular American novelist whose stories are widely read and greatly enjoyed because of their original and delightful humor. He was born at Yonkers, N. Y. After his graduation from Columbia University in 1883, he studied law in his father's office for a year and a half, and then took an editorial position in connection with the comic periodical, *Life*. Later he was associated with *Harper's Magazine, Literature, Harper's Weekly, Metropolitan Magazine,* and *Puck*. Stories have come very rapidly from his pen since the first one was published in 1886, all of which are characterized by breezy humor and contain many laughable situations, yet show the author's insight into human nature.

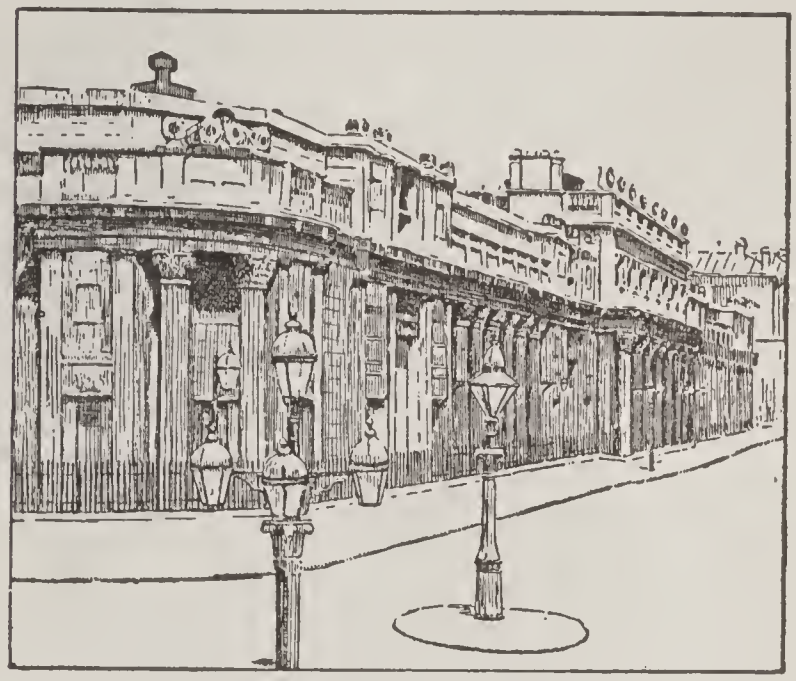
Coffee and Repartee is a collection of stories that have been described as "a mixture of Oliver Wendell Holmes and Bill Nye." Other well-known titles are *The Idiot, Mr. Bonaparte of Corsica, A House Boat on the Styx, Mollie and the Unwise Man Abroad* and *A Line O' Cheer for Each Day of the Year. Tiddledywinks Tales* was the first of a series of stories for children. He has also written the musical plays entitled *The Worsted Man, Lady Teazle* and *Tomorrowland*. Since 1910 Mr. Bangs has been in demand as a lecturer.

BAN'JO, a stringed musical instrument having a long neck and a body which consists of

BANJO

a circular frame like the head of a drum, over which is stretched a covering of parchment. The strings, made of catgut, are generally five in number, but sometimes nine. It is played by pressing the strings with the fingers of the left hand and twitching or striking them with the right hand fingers. For instrumental solos, duets, and in other combinations the banjo is in demand wherever quick and lively music is desired. It is popular among all classes, but has always been a special favorite among the negroes. In *Notes on Virginia,* Thomas Jefferson referred to the banjo as an instrument "proper to the blacks, which they brought hither from Africa, and which is the original of the guitar, the chords being precisely the four lower chords of the guitar." In Guinea the African negro still uses the *bania,* a form of banjo having grass strings.

BANK OF ENGLAND, the most powerful financial institution in the world. It was founded in 1694, a charter constituting practically a monopoly of banking being granted to



BANK OF ENGLAND

certain persons who loaned £1,200,000 ($6,000,000) to the government for use in the war then being waged against France. From that date the Bank of England has been the bank of the government and has entire management of the national debt. For this service it receives payment at the rate of $1,500 per million on the first $30,000,000 of the debt and $450 per million on all above that sum. In addition to this, the bank is allowed to profit by all transactions in the field of legitimate banking.

Many banking corporations in the United States and in European and English cities have far larger capital and deposits than the Bank of England, but the latter derives its great influence not from the money it actually handles, but because it is the accredited financial representative of the British government and people. This influence is far more power-

ful than vast aggregations of capital. The original capital, consisting chiefly of the loan made to the English government, has been increased many times, until the authorized capital at the present time is £14,553,000 ($72,765,000). The bank issues notes to the value of £17,775,000 ($88,875,000), without having gold in reserve to pay on demand; for all notes issued in excess of the sum mentioned gold must be held. The notes are of the denomination of £5 and upwards to £1,000.

The building occupied by the bank is situated in the center of the busiest part of London, almost directly opposite the Mansion House, at the corner of Threadneedle Street, hence it is frequently alluded to as the "Little Old Lady of Threadneedle Street"—a term of respect rather than of ridicule. There is nothing romantic or architecturally beautiful to distinguish it from any other building, except that it is perhaps a little more somber than its surroundings. The bank is managed by a governor, deputy governor and twenty-four directors. The board of directors meets weekly, when a statement is issued showing the financial status of the bank, in accordance with a law passed in 1844. G.H.L.

BANK OF THE UNITED STATES. In 1789, when the Constitution of the United States went into effect, there were only three banks in the country. They had a small note circulation in the cities in which they were situated, but most of the people in the states had never seen a bank note. Alexander Hamilton, Secretary of the Treasury, proposed that the government charter a bank which would issue a national paper currency and would be the financial agent of the United States.

There was much opposition to Hamilton's plan. Some critics declared that the bank would merely enrich a few capitalists at the general expense; others said that it would be an "aristocratic institution intended to pave the way to a monarchy." The most serious objections came from the followers of James Madison and Thomas Jefferson, who argued that the Constitution did not especially give Congress the right to charter any corporation. Washington, who was then President, asked Hamilton and Jefferson to prepare written statements of their views, and these papers are among the great documents of American history. In them were clearly outlined the doctrines of "strict" and "broad" construction of the Constitution, the doctrines which were to form later the basis of political parties.

The First Charter. Congress and the President adopted Hamilton's view, and on February 25, 1791, the Bank of the United States was chartered for twenty years. Its main office was fixed at Philadelphia. The capital was $10,000,000, of which the government took $2,000,000. The paper money issued by the bank was legal tender for all debts due to the national government. Its large capital and its branches in New York, Boston and other cities gave it a great advantage over the state banks and it easily dominated the banking system much as the Bank of England still does in Great Britain. The government sold its stock after a few years, and when the charter expired in 1811 the national government had no vital interest in the bank. The opposition of the state banks was strong enough to prevent the renewal of the charter, and the bank wound up its affairs.

The Second Charter. During the War of 1812 most of the state banks suspended specie payments, with the result that the paper currency of the country was in a terribly disordered condition. Some bank notes were worthless, some were worth perhaps ten cents on the dollar, a few were worth fifty cents or thereabouts on the dollar, and probably none could be exchanged at par.

Under the circumstances there arose a demand for a new Bank of the United States. The second Bank was chartered on April 3, 1816, with a capital of $35,000,000, of which the government subscribed for one-fifth. The bank was the official depository for government money, and it was the agent for the national and state governments. It prospered, and in a few years seemed as firmly established as the government itself. It had large deposits, and its notes were as good as gold, not only in the United States but in European countries.

The bank's power had made some enemies, but there was no organized opposition to it until Jackson became President. Two of Jackson's supporters in New Hampshire complained that the Portsmouth (N. H.) branch of the Bank was being mismanaged. In charge of the branch was one Jeremiah Mason, one of Jackson's bitterest opponents, and chiefly for political reasons the bank was doomed. Mason was defended by the Bank's officers, while Jackson, disregarding the Mason episode, charged that "both the constitutionality and the expediency of the law creating this Bank are well questioned by a large portion of our fellow-citizens."

Practically the whole of Jackson's first term

was taken up with the fight against the Bank. Jackson finally vetoed a bill to extend its charter, and after his reëlection ordered the withdrawal of the government's deposits. The Bank was compelled to wind up its affairs, as practically the whole of its deposits were funds belonging to the United States. W.F.Z.

For political details of the fight against the Bank, see JACKSON, ANDREW, subhead *The Administration.* See, also, BANKS AND BANKING, subhead *United States.*

BANKRUPT, a person who is recognized by law as unable to pay his debts. The property of a bankrupt may be seized by his creditors, acting under the orders of the court, and may be divided among them in proportion to the amounts due them. The word bankrupt is derived from the Italian; it really means *bank* and *broken,* and refers to the old Italian custom of breaking the benches used by moneylenders and bankers when they failed. In modern times the property of a bankrupt is not destroyed, but merely taken from him.

Originally, in English law, there was a distinction between *bankruptcy* and *insolvency,* and this distinction is still kept in most countries. A *bankrupt* must have been a person engaged in business, and only his creditors could petition against him. Persons not engaged in business could become *insolvent,* but only on their own petition. Modern English and American law no longer recognize this distinction, but divide bankruptcy into two parts, *voluntary* and *involuntary.* A debtor himself may petition for relief from his debts by bankruptcy; this is voluntary bankruptcy. If his creditors petition, it is called involuntary (not voluntary) bankruptcy, even though he offers no protest. A corporation cannot file a voluntary petition, even if it desires to do so; it must always be petitioned against.

In Canada. Under the British North America Act of 1867 the Dominion Parliament has sole control of bankruptcy, but there is no Dominion law now in force. A Dominion Insolvency Act was passed in 1875, but was repealed in 1880. Its failure was due chiefly to the differences in the provincial laws which were in effect before 1867. A Winding-Up Act, which applies only to banks, insurance and loan companies, was passed in 1882, but in all other respects it has been the policy of the Dominion government to leave the regulation of bankruptcy to the provinces. In Quebec, where the French civil code is still effective, a debtor may "abandon" his property for the benefit of his creditors on one of three conditions: (1) if he has been arrested on a writ of capias (which see); (2) if he is in business and is unable to pay his bills; (3) if any creditor, to whom he owes at least $200, demands abandonment. The abandonment only discharges the debts to the amount which the creditors receive from the estate.

In none of the other provinces is there any law by which a creditor can compel a debtor to make an assignment of his property. In all of the other provinces, however, the law provides that a debtor may voluntarily assign his property for the benefit of creditors, who may divide it *pro rata.* Such an assignment does not relieve the debtor from the payment of any unpaid balance. If a debtor refuses to make an assignment, the creditors may secure judgments, which are then paid in order of priority.

In the United States. By the terms of the Constitution Congress has power to establish "uniform laws on the subject of bankruptcies throughout the United States." The individual states are allowed to legislate on the subject, provided the state law conforms to the national statute. The present national act was passed in 1898, and has been several times amended. Petitions in bankruptcy, whether voluntary or involuntary, must be presented to the Federal district court in whose district the alleged bankrupt lives. The judge may hear the petition, or he may refer it to a referee in bankruptcy or a master in chancery, to take testimony. Final decisions, however, rest with the court. The petition states that the petitioner is unable to pay his debts and is willing to surrender his property for the benefit of his creditors.

The Five Acts of Bankruptcy. The law specifies five classes of acts which justify the court in declaring a person or corporation bankrupt. Even if a person has committed any of these acts he may prevent a decree against him if he can convince a jury that his property is sufficiently valuable to pay his debts. The five acts are as follows:

(1) If the debtor conveys or removes, or allows to be removed, any of his property with the intention of defrauding any of his creditors. In the United States any transfer of property during the four months preceding the filing of a petition in bankruptcy is void, and the property may be recovered by the creditors. In England the similar period is three months.

(2) If he transfers any of his property with the intention of preferring any of his creditors.

(3) If, being already insolvent, that is, unable to pay his debts, he allows any creditor to obtain a preferred claim through process of law.

(4) If he makes a general assignment of his property for the benefit of his creditors; or if he is already insolvent when a receiver is appointed for his property.

(5) If he admits in writing that he is unable to pay his debts and is willing to be legally bankrupt.

The Settlement. The court or the referee usually fixes a date for a hearing of the petition. At this hearing the creditors may present their claims, and either the creditors or the debtor may show cause for not decreeing bankruptcy. If the debtor is declared bankrupt his property by order of the court is placed in the possession of a trustee. If the bankrupt owns a business, the trustee usually continues it, at least for a time, in order to preserve as far as possible the good will and other assets of the firm. Eventually the property will be sold, and the proceeds divided among the creditors. After this has been done the debtor is *discharged* from bankruptcy. Any debts unpaid are cancelled by this discharge, unless they are based on fraud. A bankrupt, moreover, may be criminally liable for violation of certain clauses of the law, and a discharge may be refused if he has been bankrupt within six years previous to the petition.

Political Disqualification. In the United States a bankrupt is not disqualified from voting or holding public office. Under the English law, however, a bankrupt is not allowed to sit in either House of Parliament, nor may he vote for members of Parliament. There are a number of other specified offices from which he is disqualified. As soon as he is discharged this disqualification ends. W.F.Z.

BANKS AND BANKING. Banks are considered by the great majority of people principally as safe places in which to keep such money as they do not need for immediate uses. The worker in a factory possibly does not understand that the bank in his community may be a very important factor in promoting the business of his employer; his interest in it centers in the gradually accumulating deposit which he is laying up for himself and family. Even if banks had no other function more important than this, there would be the very best of reasons for their existence; yet they could not exist unless they were permitted to be lenders as well as custodians of the funds of others.

The integrity of a good bank and the value of its services to depositors is well illustrated, though possibly by a somewhat extreme case, in the following incident.

In the year 1860, Joseph Robbins, age thirty, first mate of a sailing vessel, carried to a bank in New York City $1,000, to be held for him for safekeeping. He was given a pass book showing this deposit, and next morning started on a long voyage around Cape Horn into the Pacific Ocean. After rounding the Horn the vessel was wrecked, and four men, including Robbins, eventually reached an uninviting island shore, where they were forced to live a number of years, during which time two died. In the course of time they were rescued by a vessel which had been blown many miles off its course, and in few weeks they landed in Australia. It answers our purpose only to know that thirty years after Robbins had set sail from New York, he was again in that city. He remembered his deposit, but had no evidence to prove its existence, for his pass-book had been lost.

"I want to see the president of this bank," said an old man of sixty years, "upon an important personal matter." He finally was introduced to one of the vice-presidents.

"Have you a sum of money on deposit to the credit of Joseph Robbins?" he asked.

Investigation proved that such was the case, but why should this weather-beaten stranger be offered this information?

"I am Joseph Robbins, and I deposited with you $1,000 the day before my last sailing from this port thirty years ago. This is my first return visit. My pass-book was lost when my boat went down, and I know no man in the

city to-day who can identify me. What do you advise me to do?"

The banker learned that the boat Robbins named actually did sail on the date claimed; that Robbins was first mate; that the vessel was never again heard from, except that wreckage was later reported by other vessels. Little by little the Robbins story was substantiated, and when the bank was assured of his identity, the man who had left $1,000 for safekeeping in the hands of an institution he felt he could trust was handed more than double that amount in cash, the original principal sum and its accrued interest.

The Business of Banking

A bank has two principal functions, that of receiving from the people their money on deposit, and the loaning of money at interest, safeguarded by good security. The money which it receives on deposit is in turn lent to other customers. A bank, therefore, is a middleman between those who have money to lend and those who want to borrow.

Functions of a Bank. The functions of a modern bank may be treated under two headings, banks as borrowers and banks as lenders. The term *borrow,* however, is not used here in a technical sense. Banks are custodians, keeping funds available for demand at any time, and the deposits of their customers cannot, in the real sense, be called loans. On the other hand, the moneys in their keeping are invested and made to produce, and are repaid to the depositors; thus the banks in effect act as borrowers. It is not necessarily money that is lent and borrowed; frequently the loan consists of the important thing called *credit,* without which modern business organizations would come to a standstill.

Banks as Borrowers. The man who intrusts his money to a bank does not, as a rule, think of his deposit as a loan; in fact, he usually puts his money in a bank for safekeeping or for convenience, but the bank uses the money to lend to those who need it. This is the greatest service which a banker performs for the community. He collects small amounts which would lie idle and unproductive, and he is then in position to lend larger amounts for productive enterprise.

The money which a bank receives on deposit is usually subject to call. It may be drawn out by the depositor in person, or on his written order. Such an order is a *check,* or *cheque.* The depositor pays his debts by ordering the bank to pay money from his account to a third person. He need not carry on his person large sums for which he has no immediate use, and he has a further advantage in that the check, when endorsed and paid, is a receipt for the payment he has made.

The bank renders another important service to the depositor. A large commercial bank each day receives hundreds of checks which it credits to the accounts of its depositors. These checks may be drawn on as many hundred different banks, but the bank in which they are deposited collects them all. If a check is drawn on a distant city, a small charge, called *exchange,* is usually made for the service. If the check is drawn by one depositor in favor of another depositor in the same bank, payment of the check is merely a matter of making proper entries in the books of the bank. If the check is deposited for collection at another bank than that on which it is drawn, the payment is seldom made by the transfer of cash but usually through the *clearing house* (which see). Besides collecting checks, a bank will collect money due on notes, bond coupons and other commercial paper for its customers.

If money deposited in a bank is regarded strictly as a loan, the depositor is entitled to interest. The many services which a commercial bank renders to its customers, however, are usually considered to outweigh this right. On small checking accounts a bank almost always loses money, the expenses of keeping them being practically as much as in the case of large accounts. It takes as much clerical work to record a deposit of $10 as one of $1,000. For this reason most banks fix a minimum balance which a depositor is expected to keep if he wishes to draw checks against it. This minimum may range from $50 in a small-town bank to several hundred dollars in a large city.

For people who want interest on their deposits a savings account is the best plan. Most large banks now have savings departments, and there are also many special savings banks. These usually pay interest at the rate of three per cent a year. Under normal conditions a savings bank will pay its depositors on demand, but it reserves the right to ask previous notice, usually of sixty days, to prevent demands which might occasion embarrassment if a good portion of its funds were out on

time loans. A modern savings bank, viewed as a borrower, has practically the same functions as the earliest banks in Europe. It receives money on deposit, and issues a receipt, in the form of a pass-book or bank-book, which is merely a convenient way of keeping a number of receipts together. If the depositor wants to draw all or part of his money, he must take his pass-book to the bank, where the proper deduction is entered on his account (see SAVINGS BANK, with subtitles *Postal Savings Bank; School Savings Bank*).

In large cities the banks sometimes become borrowers in a technical sense, borrowing sums of money at fixed rates of interest and promising payment on or after specified dates. In such cases *certificates of deposit* are issued as evidence of the banks' obligations. Such sums are really lent, and they are not subject to withdrawal by check. It should be noted that the aggregate of certificates of deposit of all the banks in the United States, both state and national, would represent but a very small percentage of the total deposits of all the banks.

Banks as Lenders. Loans by banks are either *call* loans or *time* loans. Call loans must be repaid on demand; time loans are made for a definite period. Banks usually lend money on commercial paper, or on personal notes secured by the deposit of *collateral,* usually stocks or bonds. In the majority of cases the borrower gets his loan in the form of a deposit credit, against which he may draw checks. In cities, where the check system is fully developed, this is sufficient; but in country districts, where checks are not accepted so freely, a substitute is sometimes needed. Country banks sometimes issue certificates of deposit in lieu of notes accepted for discount, but this course is rather unusual and not altogether approved by the best banks.

The money which a bank lends is either its capital or the deposits it has received. Its capital, incidentally, must be enough to inspire confidence in the public. The larger the bank's capital, the more the bankers themselves have at stake, the greater the feeling among the depositors that the bank will be managed conservatively. Practically the whole of the bank's capital can be used in its business. Of its deposits, however, a varying portion must be held as a reserve. The bank's customers are constantly adding to and drawing from their accounts, and the bank must keep enough cash on hand to meet ordinary demands. At certain periods, for example, in the harvest season, the banks are usually paying out larger amounts than they are taking in. Experienced bankers make allowances for such conditions. If the bank is unable to meet the demands made upon it for cash, it is said to *suspend payment,* and is usually forced to wind up its business. If the public has not lost confidence in the management, a reorganization, involving the addition of new capital, sometimes takes place. On the other hand, it is the business of the banker to anticipate demands and have currency ready, but if demands are unexpected and he has paper of value, he can always rediscount this paper with the banks in reserve cities, if not with the Federal Reserve Bank; thus he has the ability to supplement his cash with quick returns by the rediscount of paper of a certain character.

Banks organized under charters from the Canadian and United States governments are required by law to keep their reserves at a point thought to be safe in normal times (see, below, *Bank Reserves; Banking in Canada*). In some states, however, there is no restriction on private bankers, who are thus allowed to keep any reserve they think adequate. The danger from this source has been often demonstrated, and the regulated banks, those under the supervision of the state or nation, are always using their influence to secure legislation on the subject. But as yet there are many states in which nothing exists to prevent anybody from displaying a sign, "Bank," and taking all the deposits he can get. If he proves to be reckless or dishonest the depositors may be able to have him imprisoned, but in such a case they are almost sure to lose their savings.

Trust Companies. A trust company may or may not be a bank. In some of the Eastern United States the trust company has no general banking powers, but throughout the South and West it is more likely to be a general bank. As the name indicates, trust companies were originally chartered to perform the duties and assume the responsibilities of trustees of estates. The advantages of such organization are clear; the company is a corporation and it exists indefinitely, while an individual trustee may die the day after he is appointed. The care of estates naturally meant that such a company would have the money of estates to invest, and also investment propositions which needed money. Trust companies are chartered under state or provincial laws.

Origin of Banking. In its simplest form of money-changing, banking is as old as history. Ancient writers often referred to the money-changers, the men who bought foreign money and gave domestic coins in exchange. By the end of the fifth century of the Christian Era banking was a recognized business, and bankers not only exchanged actual money but dealt extensively in credit. The code of Justinian, which was compiled in A.D. 533, shows that there were many laws on the subject of banking.

The beginning of modern banking, however, is usually assigned to the year 1587, when the Banco di Rialto was established at Venice. As we know from Shakespeare's *Merchant of Venice* and other sources, private bankers had conducted business here at earlier dates. The Banco di Rialto, and its successor, the Banco del Giro, received deposits payable on demand, issued receipts for them, and allowed them to be transferred on written orders. The receipts were commonly used in Venice as money. The Bank of Amsterdam and the Bank of Hamburg were founded about the same time, and exercised the same functions. The receipts which they issued for deposits were commonly called *bank money,* or *current money.*

Banking in the United States. The history of banking in the United States properly began in 1782, with the chartering of the Bank of North America. In colonial days there were no banks in the sense in which the word is used to-day. There were a few organizations, called banks, which issued notes, but they did not receive deposits or carry on any other feature of a general banking business. So insignificant, indeed, were they, that the name bank was frequently given to the paper money issued by them and by the colonies. Most of the colonial governments at one time or another issued notes as loans to private individuals, who offered mortgages, silverware, horses and other property as security.

All this confusion came to an end in 1789, for the individual states, under the terms of the Constitution, were not allowed to issue notes. The Congress of the Confederation had already chartered three banks, the Bank of North America at Philadelphia, the Bank of New York at New York City, and the Bank of Massachusetts at Boston. Then, in 1791, Congress chartered a new bank, larger than any of the others and more closely connected with the Federal government—the *Bank of the United States* (which see). For twenty years the Bank of the United States dominated the banking system of the country. There were a number of state banks, however, whose combined influence was strong enough to prevent a renewal of the Bank's charter in 1811.

Then followed a five-year period of hopeless confusion and depression, during which most of the state banks suspended specie payments. At the close of the War of 1812 the demand for the "old regulator" grew strong, and in 1816 Congress issued a charter for the second Bank of the United States. This Bank, like the first, prospered, but through no fault of its own the renewal of its charter became a political, not a financial, question. The Bank incurred the enmity of President Jackson, whose efforts were chiefly responsible for its end.

The next twenty-five years included two periods of great expansion among state banks, and two periods of depression and general suspension of specie payments. Previous to the financial crises of 1837 and 1857, there was a rapid growth in the number of state banks and their deposits and loans. But the banking expansion was merely one phase of the mushroom development of the country. The craze for "internal improvements" meant plenty of money and large paper profits for banks, and many banks did a flourishing business on little or no capital. When the crash came in 1837 practically every bank in the country suspended specie payments. During the whole of this quarter-century bank notes were constantly changing in value, and weekly guides were published showing the current values and discounts. When 800 or 900 banks were each issuing five or six different kinds of notes it required more than memory to know which ones were safe. Added to the large number of good notes were hundreds of counterfeits and countless pieces of paper labeled "notes" and issued by banks which never existed. See WILDCAT BANKS.

In 1846 Congress attempted to end all connection between the banks of the country and the government treasury by establishing a system of treasury branches in the large cities. This system, though considerably modified, is still the basis of banking in the United States. The first change came soon after the outbreak of the War of Secession.

National Banks. The beginning of war made large demands on the credit of the national government. One of the duties presented to Congress was the devising of some new plan of banking. Instead of a confused and unstable system which had prevailed for twenty-five

years, the government needed a unified and absolutely safe system, one that would operate in every part of the country. After much discussion a new law was drafted and passed in February, 1863. This law was faulty in a few minor respects, and was replaced by one of June 3, 1864.

The new system provided for the establishment of *national banks,* and these were placed under the supervision of an officer in the Treasury Department, the Comptroller of the Currency. Each national bank was allowed to issue notes on the basis of bonds purchased by it from the government. At least thirty per cent of a bank's capital was to be invested in United States bonds, which were then to be deposited with the Treasurer of the United States, and the bank was allowed to issue notes up to ninety per cent of the par value of the bonds. These notes were made legal tender for all debts except customs duties. The minimum capital for a national bank in a city of more than 6,000 people was fixed at $100,000; the minimum in smaller communities was fixed at $50,000. The currency law of 1900 contained an amendment which fixed $25,000 as the minimum capital for a bank in a town of less than 3,000.

The system as adopted included a number of notable improvements over the old confusion. In the first place, the bank notes were printed under the direction of the government. They were uniform in design, and as the banks were required to keep adequate reserves, they were uniform in value throughout the country. The note of a Chicago bank was then worth as much in New York as in New Orleans. The holders of these notes were protected by the bonds which formed the basis for the note issue. The depositors in national banks were given good security for their money, for the law made the stockholders liable for the bank's debts to double the amount of their holdings of stock. More important still, national banks are required to keep their accounts in a uniform manner and must submit them on demand to inspection by government examiners.

The state banks were slow to see the advantages of the new system, and at the beginning of 1865 there were only 638 national banks. It seemed as if one of the primary objects of the law, to secure a market for government bonds, had failed. To hasten the reorganization of state banks, Congress passed a law placing a tax of ten per cent on their note circulation. By the time this tax went into effect, on July 1, 1866, 1,000 more banks had received national charters. The number of national banks increased gradually, until in 1900 it was about 3,600. Largely because the act of 1900 reduced the minimum capital from $50,000 to $25,000, the number of banks increased to 7,045 in 1910 and to 7,500 in 1915.

Banking Reform. The inflexibility of the national banking system was plainly evident in 1903 and during the financial panic of 1907. In the latter year the Aldrich-Vreeland Bill, providing for the issuance of emergency currency, was passed, but no bank ever cared to take advantage of the law lest such action be regarded as evidence of extreme weakness. The need for new monetary legislation became more and more evident, and in 1910 the Senate of the United States appointed a National Monetary Commission, under the chairmanship of Senator Nelson W. Aldrich, to investigate the whole question of banking reform. The Aldrich plan, as proposed in a report issued in 1911, called for a National Reserve Association, which was practically a central bank.

It was soon evident, however, that the report of the Commission would carry no weight, and that the public was fearful of a central bank. Accordingly the National Citizens' League was organized to create a public sentiment in favor of some banking system, and this organization put out a platform which, for three years, was pressed home to the public by publicity methods and by addresses, until the country was ready, in 1911, to support Congress in the framing of a new monetary measure. The work of the National Citizens' League ran for a period of about three years and cost between $500,000 and $600,000, but it was so effective that when the Banking and Currency Committee of the House took up the question of forming a banking bill they had the country behind them with an almost unanimous insistence that the work be speedily done. The system created by the law of 1913, the present Federal Reserve system, differs from the plan of the Aldrich Commission chiefly in that the function of issue lies with the Federal Reserve Board, and the concentration is in twelve centers instead of one. A feature of the Aldrich plan, which did survive, was a provision for district associations and for branches of the district associations. These latter have never been put into operation.

Federal Reserve Banks. The locations of the twelve Federal Reserve Banks created by the act of 1913, and the districts which they

FEDERAL RESERVE DISTRICTS

The twelve districts and branch territories, and location of the Reserve Bank and branch cities in each.

serve, are shown on the accompanying map. Every national bank in the United States must subscribe six per cent of its capital and surplus to the stock of the reserve bank in its district. State banks may subscribe, but are not required to do so. As the capital and surplus of individual banks vary from year to year, the capital of the reserve bank varies, but the minimum capital is $4,000,000.

Each reserve bank is under the direction of a board of nine directors, three of whom are bankers named by the member-banks of the district, three of whom are citizens, not bankers, but named by the banks, and three of whom are appointed by the Federal Reserve Board at Washington. The *Federal Reserve Board* is in supreme control of the entire system. It is composed of the Secretary of the Treasury and the Comptroller of the Currency, who are members *ex officio,* and five other members appointed by the President for a term of ten years at a yearly salary of $12,000. Two of these five members must be experienced bankers, but must have no connection with any bank during their term of office.

The primary function of a Federal Reserve Bank is to rediscount commercial paper. A national bank, for example, presents to the reserve bank notes which it has discounted for its own customers. The reserve bank rediscounts the notes, thus releasing the funds of the national bank. In ordinary times the reserve bank will pay for such commercial paper out of its current funds, but if there is a great demand for money, and if much paper is being presented, it will pay for them in Federal Reserve or treasury notes. These notes are issued in denominations of $5, $10, $20, $50 and $100. If the demand increases the supply automatically keeps pace. A reserve bank is not allowed to pay out the notes of another, except on the payment of a ten per cent tax. This tax is prohibitive, and hastens the retirement of notes as soon as they have served their immediate purpose. The United States Treasury will redeem in gold all Federal Reserve notes presented to it, and the reserve banks keep in the Treasury a redemption fund for this purpose.

One of the three directors of each bank, appointed by the President, is designated *Federal Reserve Agent,* and the notes are in his custody until they are needed. To secure the notes the reserve bank must deposit with this

agent the commercial paper which it is buying. As an additional security it must maintain a gold reserve of forty per cent of the face value of the notes.

Besides making the currency more flexible, the law of 1913 extends the privileges of national banks. With the approval of the Federal Reserve Board any national bank whose capital and surplus total $1,000,000 may establish branches in foreign countries. Any reserve bank may also buy and sell in the open market, either at home or abroad, various kinds of commercial paper. Another notable feature is that the banks in the United States are for the first time allowed to recognize the peculiar needs of agriculture. A Federal Reserve Bank may discount ordinary commercial paper for ninety days, but it may discount for six months any paper issued for agricultural purposes. National banks everywhere, except in New York, Chicago and Saint Louis, may make loans on farm mortgages for a period not exceeding five years. Such loans must not exceed twenty-five per cent of the bank's capital and surplus and fifty per cent of the value of the farms mortgaged.

Bank Reserves. Under the old law of 1864 there were three cities, New York, Chicago and Saint Louis, which were "central reserve cities"; besides, there were a number of "reserve cities." The law of 1913 keeps this distinction. In the three cities named each national bank must keep a cash reserve of eighteen per cent of its demand deposits and five per cent of its time deposits. In the other nine reserve cities, only fifteen per cent of the demand liabilities must be kept in reserve, and in all other cities only twelve per cent is required. In every bank, however, five per cent of its time liabilities is the minimum reserve. Only a part of the reserves, however, need be held in the bank's own vaults; the remainder must be placed on deposit with the Federal Reserve Bank of the district. This bank, in turn, must keep a cash reserve of thirty-five per cent of its total deposits.

Summary of Banking in the United States. There were in the United States at the end of June 1915, 19,460 banks, the total paid-in capital stock of which amounted to $1,094,297,-274.93. The surplus fund amounted to $1,010,-908,917.30. The number of banks included 14,605 state banks, 630 mutual savings banks, 1,529 stock savings banks, 1,660 loan and trust companies and 1,036 private banks. The total resources of all banks totaled $16,010,061,699.58.

Banking in Canada. The first attempt to organize a bank in Canada was made in 1792, when the Canada Banking Company of Montreal applied for a charter. In the next twenty years several others attempted to secure charters from the government; all failed. Finally, in 1817, a number of citizens organized the "Montreal Bank," a private institution. It was later chartered by the government, and is still world-famous as the "Bank of Montreal."

For fifty years, banking in Canada, then a group of separate colonies, made steady but not sensational progress. In 1867, by the British North America Act creating the Dominion of Canada, it was placed under the control of the Dominion government. The acts of Parliament on which the present system is based were passed in May, 1870, and April, 1871. Banks are chartered for ten-year periods, and there is a provision that the banking laws shall be revised every ten years. In 1910, however, no revision was attempted because of disturbed conditions, and the next banking act was passed in 1913, to be effective until 1923.

These decennial revisions have added to the safety of the Canadian system, but have not altered its principles. The law of 1890, for example, created a redemption fund for bank notes, each bank being required to deposit with the government a cash payment of five per cent of its maximum circulation. If any bank's assets are not enough to pay its outstanding notes, the difference is made up from this fund. In this way all the banks become responsible for the payment of the notes of each individual bank. In 1900 the law provided for the organization of the Canadian Bankers' Association, which exercises a general supervision over all banks. The act of 1913 made a few new regulations for the protection of the stockholder and the depositor. An interesting innovation was the permission given to the banks to lend money on farm stock and on grain in storage. The act also creates a central gold reserve, under the control of a board of trustees. A bank may issue notes, dollar for dollar, for all gold or Dominion notes deposited by it in this reserve fund.

To secure a government charter, a bank must have a capital of $500,000, one-half of which must be paid in before the charter is granted. While the organization is being perfected, this sum of $250,000 is in the custody of the government. The laws of the Dominion fix the details of the process of organization. A director of the bank is required to own at least three

OUTLINE AND QUESTIONS ON BANKS AND BANKING

Outline

I. Functions of the Bank

(1) As borrowers or custodians of funds
  (a) Safekeeping of funds
  (b) Use of the check
  (c) Collection of checks on different banks
  (d) Checking accounts
  (e) Savings accounts
  (f) Actual borrowing of banks
(2) As lenders
  (a) Call loans
  (b) Time loans
  (c) Collateral
  (d) Form of loan
    1. Deposit credit
    2. Certificates of deposit
  (e) Loaning of capital
  (f) Loaning of deposits
    1. Necessity for reserve
    2. Dangers of unrestricted private banks
(3) Trust companies
  (a) May or may not be bank
  (b) Advantage over individual trustees
(4) Savings banks
  (a) Postal savings banks
  (b) School savings banks

II. History of Banking

(1) Origin
(2) Beginnings of modern banking
(3) Banking in the United States
  (a) In the colonies
  (b) The Bank of the United States, 1791
  (c) State banks
  (d) Second Bank of the United States, 1816
  (e) Growth of state banks
  (f) Wildcat banks
  (g) National banks
    1. Government supervision
    2. Minimum capital
  (h) Banking reform
    1. Aldrich plan
    2. Federal Reserve Banks
    3. Banking reserves
(4) Banking in Canada
  (a) In colonial times
  (b) Governmental control
  (c) Recent laws
  (d) Method of organization
  (e) The reserve question

Questions

What is the greatest service which a bank performs for a community?

What are the two great advantages of a check?

What play of Shakespeare's tells something of banking methods in early modern times?

What did the National Citizens' League accomplish?

How large a capital must a Canadian bank have to secure a government charter?

Under what circumstances may the depositors of a savings bank not receive their deposits on demand?

What was the popular name for the Bank of the United States in its early days?

Under what conditions may one reserve bank pay out the notes of another?

Why cannot a bank be run without capital, solely with the funds of its depositors?

How did the War of Secession affect banking in the United States?

What is the difference between a "central reserve city" and a "reserve city"?

If a depositor in a bank draws a check in favor of another depositor in the same bank, how is the matter adjusted?

What different meanings attached to the word "banks" in colonial times in America?

Outline and Questions on Banks and Banking—Continued

How many Federal Reserve Banks are there?

How much must each national bank subscribe to the reserve bank of its district?

How does Canada deal with the question of bank reserve?

Why is it absolutely necessary that banks be lenders as well as custodians of funds?

What is the difference between a call loan and a time loan?

Has the establishment of Federal Reserve Banks given to the national banks any new privileges?

What is the advantage of a trust company over an individual trustee?

Give briefly statistics showing the increase in the number of national banks in the United States.

What is the oldest bank in Canada, and what is its present status?

Why is no interest usually paid on checking accounts?

When was the first Bank of the United States chartered, and how long did it exist?

How many directors has a Federal Reserve Bank, and how do they obtain their office?

Why cannot small independent banks exist in all the cities of Canada? What makes up for this lack?

What was the Aldrich-Vreeland Bill, and why did it have no effect on the banking conditions of the country?

How are matters arranged in Canada so that all the banks are responsible for the payment of the notes of each bank?

Why is it not safe to deposit money in a private bank, that is, one not under government supervision?

What were the advantages of the banking system established in the United States in 1864 over that previously in force?

About what is the total capital stock of the banks of the United States? What are their combined resources?

What are certificates of deposit?

Why was it necessary at one time to issue weekly statements as to the value of bank notes?

What are the duties of a Federal Reserve agent?

What is meant by the "double liability" of stockholders? Is it in force both in the United States and in Canada?

May a bank safely loan all of its capital? All of its deposits? Why?

What are the functions of a clearing house?

Why was the establishment of special "savings" banks considered necessary?

Where are the Federal Reserve Banks located?

About what is the total capital of the chartered banks of Canada?

What is meant by *collateral,* and of what does it usually consist?

What is the smallest sum that may be deposited in a postal savings bank?

How large a sum may one depositor have to his credit?

What restrictions as to farm mortgages are placed on the banks of Chicago, New York and Saint Louis?

What provision is made in Canada for the revision of banking laws?

What is the object of school savings banks, and how have they accomplished their purpose?

What were "Wildcat" banks?

per cent of its stock; if its capital is $1,000,000, he must invest $30,000. The par value of all bank shares is $100. As in the United States, stockholders have a "double liability"; in other words, if the bank fails and its assets are not enough to pay its debts, a stockholder is liable for an added $100 for every $100 share he owns.

In the United States, national banks, as explained above, are required to keep a fixed percentage of their deposits as reserve. In Canada there is no fixed reserve, the only requirement being that forty per cent of whatever reserve a bank does keep must be in legal tender. A restraining influence on reckless financiering is exerted by the Canadian Bankers' Association and by the fact that a detailed statement of the bank's accounts must be sent to the government each month. This statement is published in the *Canada Gazette.*

The large capital required before a Dominion charter may be issued makes it impossible to establish independent banks in all the cities which need banking facilities. Canadian chartered banks, however, establish branches throughout the Dominion, and there is no town of consequence without one or more branches. Each branch has its own local manager, its own depositors and its own accounts, but the manager is responsible to the home office. There are now about twenty-two chartered banks in the Dominion, and over 3,000 branch banks. The authorized capital of these chartered banks amounts to nearly $189,000,000, and the reserve fund is over $113,000,000. H.W.

Consult Muhleman's *Government Supervision of Banking Throughout the World;* Dunbar's *Theory and History of Banking.*

BANK, Savings. See Savings Bank.

BANKS; State. See State Banks.

BANKS, Nathaniel Prentiss (1816-1894), an American soldier, born at Waltham, Mass., and popularly known as "the bobbin boy," because as a child he worked in a factory. He studied law, was admitted to the bar, and after serving in the state legislature was elected in 1853 to Congress, where he was made Speaker of the House of Representatives. In 1857 he became governor of Massachusetts, and on the breaking out of the War of Secession joined the Union army. His first achievement of note was the defeat of "Stonewall" Jackson at Winchester in 1862. Later in the year, after holding the command of the defenses at Washington, he was placed in charge of an expedition to New Orleans, and on his arrival in that city succeeded Butler as commander of the Department of the Gulf. He was successful in compelling the surrender of Port Hudson, but failed, in 1864, in an expedition up the Red River and was relieved of his command. Resigning his commission, he returned to Massachusetts and was again elected to Congress, where he served for five terms, much of that time as chairman of the committee on foreign relations. In 1888 he was again elected to Congress but two years later retired from public life.

BANNOCKBURN, *ban' uk burn,* a village in Scotland where Robert Bruce, in 1314, won independence for his country by his victory over Edward II of England, and secured for himself the throne of Scotland. The English had the advantage in numbers, the Scotch in position, and the latter further aided their cause by digging a number of military pits along the line of the enemy's advance. The English were totally routed, losing 10,000 foot soldiers and 200 knights out of their army of 60,000. The Scotch army, 40,000 in number, suffered a loss of 4,000. The ringing lines of Burns's *Bannockburn,* the first stanza of which follows, contain the words that the poet fancied Bruce addressed to his soldiers just before the fight:

> Scots, wha hae wi' Wallace bled;
> Scots, wham Bruce has aften led;
> Welcome to your gory bed,
> Or to victorie!

The village of Bannockburn is about three miles southeast of Stirling, on the Bannock rivulet. Though its population is less than 3,000, it has important manufactures of tweeds, carpets, tartans and leather. An object of interest in the town is the stone in which Bruce set his flagstaff before the famous battle.

BANNS OF MARRIAGE, the public announcement, usually read in a church, of the intention of a man and a woman to be joined in marriage. The custom of publishing marriage banns originated in the desire of the Church to protect its children from harmful or unsuitable unions, for anyone who hears the banns read is privileged to object to the approaching marriage if he knows of any reason why it should not take place. The great Catholic Council of Lateran, held in 1215, ordered banns to be published before the marriage ceremony in every Christian country. The custom is still generally practiced in Roman Catholic countries and in England, and also prevails among the Roman Catholics of Canada and the United States.

BANTU, *ban too'*, the name applied to a large group of native tribes of Central and South Africa, varying in many respects physically and racially, but all speaking languages derived from one original tongue. Of all the Bantu tribes the most powerful are the Zulus, who regard themselves as far superior to all other African natives, whom they class as "dogs." The Basutos, an offspring of the Zulu nations by emigration and intermarriage with Kaffir tribes, the Matabele, the Swahili and the Bechuanas, are also important branches of the Bantu nations. With the exception of the Hereros, the Bantus are all agriculturists and understand the arts of pottery making, weaving and iron smelting. Until recent years, however, their principal occupation was war, only women performing the useful tasks of husbandry and cattle raising.

THE BANYAN TREE

At the left, the largest banyan tree in the world, described in the text; at the right, a small tree, showing how the larger ones develop.

BAN'YAN, or **BANIAN,** a remarkable tree of India, which may in itself reach the size of a grove or small forest. The peculiar feature of this tree is its method of growth. In the first place, it does not usually begin on the ground. Seeds are dropped by birds in the tops of palm trees, where they speedily germinate, sending down roots to the soil, and, in time, killing the tree on which they grow. Then, as branches develop, these throw down supports, which take root as soon as they touch the ground, enlarge into trunks and extend branches in their turn, eventually covering a wide extent of ground.

As the Hindu word for trader is *banian,* it is probable that the tree is named because the Hindu merchants frequently spread their goods in the shade of these tree-forests. One of the most famous of the banyan trees is that in the Botanic Garden at Calcutta, with its main trunk of thirty feet circumference and its 230 smaller trunks. The largest banyan tree known is on the island of Ceylon, which has 350 great trunks and over 3,000 smaller ones. A certain banyan, famed in history, was so huge that 7,000 men camped under it. Banyan wood is soft and porous, and from its white, sticky juice bird-lime is sometimes prepared.

BAPTISM, *bap' tis'm,* a Christian ceremony or rite by which a person seals his vows to God and the Church. While on earth, Christ commanded his disciples, "Go and teach all nations, baptizing them in the name of the Father, and of the Son and of the Holy Ghost." Before Christ gave this commission to the disciples, John the Baptist had preached repentance, and had baptized many, and Christ came to him to be baptized in the Jordan.

Baptism was established as a requirement for admission to the Church of Christ from the beginning. On the day of Pentecost, "Peter said unto them, Repent and be baptized everyone of you in the name of Jesus Christ for the remission of your sins, and ye shall receive the gift of the Holy Ghost. Then they that gladly received his word were baptized." Wherever churches were established converts were baptized. The baptism of John signified repentance for sin; that ordained by Christ, the reception of the Holy Spirit.

At first all baptism was by immersion, and some denominations, particularly the Baptist, still hold to that mode, but the method of sprinkling or pouring is now in use in most Protestant churches. The ceremony varies in minor particulars in different denominations, but the significance of the rite is the same in all.

Infant Baptism. The Roman Catholic and Greek Reformed churches baptize infants, as do most of the Protestant denominations. When the infant is baptized he is dedicated to Christ and the Church, but the conditions upon which

the child may in after years be admitted into full membership in the Church vary widely among the different denominations.

BAP'TISTS, a Protestant denomination which holds that the only acceptable mode of baptism is by immersion (see BAPTISM). The name was first applied in 1644 to English congregations holding this opinion. The first Baptist church in America was founded by Roger Williams at Providence, Rhode Island, in 1639. There are twelve different branches of Baptists in the United States. They have about 43,000 ministers, over 58,780 churches and over 7,237,000 members. The church in Canada has about 410,000 members.

Baptist Young People's Union. On July 7 and 8, 1891, all the organizations of young people of the Baptist churches in America united in a federation to which they gave the name, The Baptist Young People's Union of America. The organization has branch societies in every state in the Union and every province of Canada. The main purpose of the society is to so organize the young people of the denomination that they will assist in the most efficient manner in carrying on the activities of the Church.

Free Baptists, one of the largest branches of the Baptist Church, founded in 1780 in New Hampshire by Benjamin Randall, which differs from the main body of the Church by having open communion. After 1820 the Church made great progress in New England and the Middle West. At present its membership in America averages about 150,000.

BARABBAS, *ba rab' as,* the murderer whom Pilate released to the Jews when he delivered Jesus to be crucified. Pilate was the Roman governor of Judea, and according to the New Testament account, it was customary to pardon one or more prisoners during the feast of the Passover. Desiring to pacify the Jews and at the same time escape the responsibility of sentencing Jesus to be executed, he said to the Jews: "Whether of the twain will ye that I release unto you? They said Barabbas."

BARBADOS, *bahr ba' doze,* the most easterly of the West India Islands, and the most densely populated island in the world, averaging 1,195 people per square mile. It is of coral formation and is probably founded on a volcanic base, as it is subject to earthquakes. The climate is mild and healthful. In 1752 George Washington undertook the one foreign journey of his life, accompanying his invalid brother Lawrence to Barbados.

The soil in the lowlands is very fertile, and large crops of sugar cane are raised. Other important products are cotton, coffee, tobacco, indigo and arrowroot. The leading industries are the manufacture of sugar and rum, but the island has considerable commerce and important fisheries. Barbados is the headquarters for the English forces in the West Indies. The capital is Bridgetown, on the only good harbor the island possesses. The island was discovered in 1518, was occupied by the British in 1625, and has always been a British possession. It is administered by a governor, assisted by an executive committee and a legislative council, all appointed by the British government, and a house of assembly elected by the people. Population in 1920, 198,336.

BAR'BARA, SAINT, a saint of the Roman Catholic Church who, according to legend, was beheaded by her father for accepting Christianity. No sooner had he killed her than he himself was struck dead by lightning, and so Saint Barbara is prayed to in time of storm, and is considered the guardian saint of artillery. The powder room in a French ship of war is named *Sainte-Barbe.* Saint Barbara's day is the fourth of December. She is supposed to have lived in the third century and to have suffered martyrdom at Nicomedia, in Asia Minor.

BAR'BARA FRIETCHIE, *fre' chi,* the aged heroine of Whittier's poem of that name, who risked her life to save her country's flag from dishonor. The poem is based on a story that sprang up during the War of Secession, and was first published in the *Atlantic Monthly* in 1863. According to the story, the men of Frederick, Md., hauled down the American flag on the approach of the Confederate troops under Stonewall Jackson. Old Barbara Frietchie, "bowed with her fourscore years and ten," loyally set the flagstaff in her attic window, and when the Confederates, at the word of command, rent the banner with a blast from their rifles, she dauntlessly seized the flag and, in the words of the poem—

> She leaned far out on the window-sill
> And shook it forth with a royal will.
>
> "Shoot, if you must, this old gray head,
> But spare your country's flag," she said.

Stonewall Jackson was moved by her appeal, for—

> A shade of sadness, a blush of shame
> Over the face of the leader came;
>
> "Who touches a hair of yon gray head
> Dies like a dog! March on!" he said.

Barbara Frietchie is one of the best of Whittier's shorter narrative poems, and its martial ring, interesting story and pleasing rhythm make it a great favorite with children.

BARBAR'IAN, a name given by the Greeks to everyone who spoke any language but Greek. Thus when Saint Paul, in his *Epistle to the Romans,* said "I am debtor both to the Greeks and to the barbarians," he meant not uncivilized people, but simply non-Greeks. Originally the word had no unpleasant meaning, but naturally, because the Greeks thought themselves superior intellectually to any other people, it soon took on something of the modern meaning—rude, uncivilized and illiterate. The Greeks applied the term to the Romans, who in turn made use of it to describe all who spoke neither Latin nor Greek. The origin of the word is uncertain, but it probably was an imitation of some of the senseless sounds of which, to the Greek ear, all other languages seemed to be made up.

BARBAROSSA, *bar bah ros' a,* a surname given to Frederick I of Germany (which see). It means *Redbeard.*

BARBARY, STATES, those countries in North Africa that lie along the southern shore of the Mediterranean Sea, the modern names of which are Morocco, Algeria, Tunis and Libya (until 1912, Tripoli and Barca). They are inhabited by settled, and also by wandering, Arabs, Moors, Jews, Turks, negroes, a few Europeans and by the Berbers, the original inhabitants, from whom the region takes its name.

Historically, the Barbary states are of great interest. Along the coast in ancient times the Phoenicians established thriving colonies and cities, the most famous of these being Carthage, renowned for its wealth and splendor. It was envied by the Romans, who sacked and destroyed it in 146 B. C. In the time of Emperor Constantine the Romans held sway over nine provinces in North Africa, and the ruins of the great towns they built are to-day an interesting feature of the country. The Moors, driven out of Spain by the Christians in the fifteenth century, settled in North Africa and began a career of piracy that made them the terror of Mediterranean seamen for years, and the European nations secured protection for their commerce only by the payment of tribute.

The United States, in the early years of its history as a nation, took the initiative in putting a stop to these outrages. In a war with Tripoli (1801-1804), in which the Americans distinguished themselves in many daring exploits, the ruler of Tripoli was forced to respect the sea rights of others. There was further trouble during the War of 1812, but in 1815 Algiers, Tripoli and Tunis were glad to sign peace treaties with the United States when a fleet commanded by Stephen Decatur sailed into the harbors of their chief ports. Since then the Barbary pirates have given no trouble.

Turkey, once the dominant power in North Africa, has no authority in the Barbary states at the present time. Algiers is a French colony, Morocco and Tunis are French protectorates, and Tripoli, including Barca, was wrested from Turkey by Italy in 1912, and the name changed to Libya. See MOROCCO; ALGIERS; TUNIS; TRIPOLI.

Consult Pool and Kelly's *The Story of the Barbary Corsairs;* Allen's *Our Navy and the Barbary Corsairs.*

BARBECUE, *bahr' be ku,* a word of doubtful origin. It first signified the practice of roasting a hog, ox, or other large animal entire, on a rude gridiron of stakes placed in an open field. From this the meaning of the word has been extended to apply to any open air celebration where animals roasted whole, and large quantities of other food and drink are the leading feature of entertainment. Barbecues, especially in the West and South, were formerly often given in connection with open air public meetings, but they have lost much of their popular character, and have been abandoned completely in most parts of the country.

BARBER, a word derived from the Latin *barba,* meaning a *beard,* and applied to one whose occupation is to shave or trim the beard and cut and dress the hair. In early days barbers also practiced surgery, but the two professions were made distinct by an act passed during the reign of Henry VIII by which the barber-surgeons were forbidden to perform any surgical operation but blood-letting and tooth drawing, and the surgeons were not to practice "barbery," or shaving. This continued till the time of George II.

The sign of the old profession—the pole with its stripes representing the bandage with which the barber wrapped the patient after blood-letting—is still retained by barbers. In the United States barbers are organized in a powerful trade union which regulates wages, hours of work and charges to be made. Women have entered the profession in large cities, where they feel public opinion will not frown too heavily upon them. There are barbers' schools in which young men may learn the trade in a fairly scientific way, but most barbers begin their career in this trade as boys-of-all-work in the shop and gradually learn the details.

Barbers Itch. This is an irritating, unsightly and infectious rash, appearing on the face and neck, so-called because it is usually conveyed by the use of unclean barbers' instruments. If not carefully treated, the rash develops into large sores which discharge yellowish matter or pus. The trouble is caused by a parasitic fungus which finds its way into the hair cavities; it can be cured only by the complete destruction of the parasite. This can be accomplished by use of antiseptic washes, but it is always advisable to obtain a physician's advice.

In many states barbers are required to keep their various instruments in an antiseptic condition. Their shops are regularly inspected by an expert working under the authority of the state.

BAR'BERRY, an ornamental shrub consisting of about 100 species, which grow in the temperate regions of both the eastern and western hemispheres. The common barberry, found in Eastern New England and in the Upper Mississippi valley, is a spiny shrub from four to six feet high, bearing oblong leaves with saw-toothed edges, pale yellow flowers and scarlet or orange-scarlet berries. The latter are extremely sour, and are used in making a jelly of beautiful color and attractive flavor. The stamens of the barberry blossoms are interesting to study, for they are held away from the pistils by a fold in the corolla, and are released only by the breath of the wind, a touch of the hand or a passing insect. The barberry is a favorite shrub for hedge fences, but should not be planted in wheat-growing districts, as a yellow fungus, very destructive to the grain, is often found on the under side of the leaves. The root of some species of barberry produces a yellow dye used in coloring wool, and the bark of some is used in tanning. India produces a barberry that has medicinal properties, the extract obtained from it being used in treating inflammation of the eye.

BARBERTON, Ohio, a city in Summit County, in the northeastern part of the state, known locally as the *Magic City,* because of its rapid growth. It was settled in 1815, but its growth began in 1892, when it was incorporated; in that year O. C. Barber, president of the Diamond Match Company, centered his interests here. In 1910 the population was 9,410; by 1920 it had increased to 18,811. The city is seven miles southwest of Akron and thirty miles south of Cleveland, on the Erie, the Baltimore & Ohio and Pennsylvania railroads; an electric line extends west to Wadsworth. The area exceeds two square miles.

The chief industry of Barberton is that of making matches and match-machinery. Sewer-pipes, boilers, chemicals, valves, rubber, strawboard, pottery, porcelain, salt and paint are among other important manufactures. Barberton was originally known as New Portage.

BARBIZON, *bahr be zon',* **PAINTERS,** one of the most important groups of nature painters in all the history of art. They lived and worked in the Barbizon region in France, near the forest of Fontainebleau, and were not a "school" of painters any more than the Lake poets of England were a "school" of poets.

They had certain very definite ideas in common, however, and these ideas they succeeded in making central in much of modern art. First of all, they insisted that every picture, whether it represented a landscape, a scene from peasant life, or a group of cattle, must be painted directly from nature; and second, they believed that every picture must express the artist's mood.

Some of the greatest of French artists were Barbizon painters, for Rousseau, Corot, Daubigny, Troyon and Millet were numbered among them. Millet's peasant-life paintings stand as models of what that sort of art can accomplish; Troyon's cattle pictures have never been surpassed; and Corot's misty landscapes still hold their charm for artists and the public. American artists were especially influenced by the Barbizon principles, and Inness, the foremost landscape painter of the United States, is almost as typical a Barbizon painter as if he had belonged to the group. See PAINTING.

BARBOUR, RALPH HENRY (1870-), a popular American author of bright and entertaining stories for boys. He was born in Cambridge, Mass., and began his education for the writing profession at the age of nineteen, as a reporter for a Boston paper. Later he was associated with a paper in Denver, Colo. Barbour has written short stories and poems for magazines under the pen name of "Richard Stillman Powell," but is best known through his narratives for boys and about boys, published under his own name. Most of these deal with school life and sports, as suggested by the titles *The Halfback, Captain of the Crew, On Your Mark, Winning His Y, The Junior Trophy,* etc. His stories are full of life and action, are written in a clear and popular style, and are clean and wholesome reading for young people.

BARCELONA, *bahr se lo' na,* the most important commercial center and a seaport of Spain, is situated on the Mediterranean coast. It is the capital of the province of the same name, and after Madrid is the finest city in the kingdom. Barcelona is divided into the upper and lower town; the former is modern and attractive, many of the houses being built of hewn stone; the latter is old, irregular and brick-built. On a hill in the center of the old town stands the imposing cathedral, dating from the sixteenth century and one of the finest examples of Gothic architecture. The principal manufactures are cottons, silks, woolens, machinery, paper, chemicals, stoneware and soap. Manufactured products such as cotton, wine, brandy, fruit and oil are the principal exports, and coal, textile fabrics, machinery, cotton, fish, hides, silks and timber are among the chief imports.

Barcelona was governed by its own count until the twelfth century, but was united with Aragon in 1151. In 1640, with the rest of Catalonia—of which it was formerly the capital—it placed itself under the French crown, and twelve years later it submitted again to the Spanish government. In 1697 it was taken by the French, but was restored to Spain by the terms of the Peace of Ryswick, in 1714. Population in 1918, including suburbs, 582,240.

BARD, one of the poet singers who held so important a place among the ancient Celtic peoples, especially the Welsh and the Irish. All through the Middle Ages, from the sixth century, at least, the bards of Wales and of Ireland had a large part not only in the literary life of their countries, but in their history. They composed verses in honor of the heroic deeds of princes or brave men, and these they sang at court or at special festivals, generally to the accompaniment of the harp. Naturally, they acquired an immense hold on the people, whom they could sway to peace or to war, almost as they chose, and the kings of England therefore looked upon them with great disfavor. In the thirteenth century Edward I, anxious to make absolute the English rule in Wales, decreed that all the Welsh bards were to be hanged, and it is on this event that Gray based his poem, *The Bard.* The Cambrian Society, formed in Wales in 1818, has as its purpose the preservation of the order of the bards established centuries ago.

The term is often used poetically to describe any poet, as "Shakespeare, the Bard of Avon."

BAREBONES PARLIAMENT, *pahr' li ment,* the name that was scornfully applied to the "Little Parliament" summoned by Cromwell in 1653, one of the most energetic members of which was a Baptist tanner who had the strange name of Praise-God Barebone. This parliament, which was made up of 140 men of Cromwell's type, sat in session from July 4 to December 12, and, in spite of the ridicule it aroused, has to its credit the passage of several wise measures. Among these was the law providing for the civil marriage celebration before a justice of the peace, and for civil marriage registration. See PARLIAMENT.

BAR HARBOR, ME., a popular summer resort on the east shore of Mount Desert, a large

island off the coast of Maine, so named because of the sandy bar which connects Mount Desert with a neighboring island. Aside from its location on a beautiful harbor, the town is near many interesting points, including Green Mountain, Eagle Lake, Great and Schooner Heads, Thunder Cave and Eagle Cliff. It lies forty-six miles southeast of Bangor, Me. Bar Harbor is one of the more exclusive of the Eastern summer resorts for the well-to-do; so given to exclusiveness and quiet is the summer colony that it was not until the summer of 1915 that automobiles were permitted on the island. The permanent population is about 2,000. See MOUNT DESERT, also full-page illustration in article MAINE.

BARI, *bah' re,* the capital of the province of Bari delle Puglie, and a seaport on the Adriatic coast of Southern Italy, sixty-nine miles northwest of Brindisi. As early as the third century B. C. Bari was a place of importance; it has been three times destroyed and rebuilt. The present town has broad streets and numerous gardens and squares. The cathedral is a massive building with a tower 260 feet high, but in historic interest it is surpassed by the Church of Saint Nicholas, founded in 1087. Here are kept the bones of Saint Nicholas, from which, tradition says, a healing fluid flows. Thousands of pilgrims annually visit the tomb. In July, 1915, during the progress of the War of the Nations, and soon after Italy joined the allies, the town of Bari was heavily bombarded by the Austrian fleet, much damage being done to the docks and buildings. The city manufactures cotton and linen goods, hats, soap, glass and liquors. A United States consul is stationed here. Population in 1911, 103,520.

BARIUM, *bay' ri um,* a silver-white to yellow metallic element which is chemically obtained from barite, witherite and some other more complex minerals. The name is from the Greek and means *heavy,* referring to its density. Barium was first obtained in 1808 by Davy, the celebrated English chemist. It is pliant and can be easily worked without breaking. It oxidizes readily, decomposes water, and fuses at a low temperature. Barium forms a number of commercially important salts, and barium compounds are used for many purposes. The soluble and carbonate salts are poisonous.

Barium Sulphate, one of the salts of barium, precipitates as a fine white powder. It is found as the mineral *barite* in many parts of America and Europe, and is used as a common adulterant of ordinary white paint, to increase the weight of paper, and was used by Wedgwood in his jasper-ware. It is also used in the manufacture of artificial ivory, leather, wall-paper and asbestos cement. The value of the production in the United States amounts to about $250,000 annually, but the production is decreasing. Canada produces between $5,000 and $10,000 worth each year.

Barium Nitrate, another of the salts of barium, is used extensively in the manufacture of fire-works, especially "green fire."

Barium Sulphide shines freely in the dark, after having been exposed to a bright light, and, on this account, is used in making luminous paint.

Barium Chromate is used as a pigment and as an ingredient of matches.

Barium Dioxide or *Peroxide* is used in the manufacture of peroxide of hydrogen (which see), and as a bleaching agent in preparing oxygen.

Barium Monoxide, or *Baryta,* a grayish-white, poisonous substance, is used in sugar refining. When added to molasses or sugar solutions it is insoluble.

Barium Hydrate, uniting readily with lime, is used to soften water in boilers and thereby prevents formation of lime deposits. E.D.F.

BARK, the outer covering of stems, branches, trunks and roots of trees, most shrubs and some plants, as distinguished from wood. It is usually composed of three layers. The *inner bark,* or *fibrous bark,* lying next to the wood, carries food and water very much as arteries and veins of animals carry blood. This part is also called the *bast.* It is composed of long woody cells which, in some plants, form valuable fibers. The *middle bark,* or *green bark,* is merely a tissue, but it contains the green coloring matter (see CHLOROPHYLL) which manufactures starch here in the same way as it does in leaves. This part does not grow much, and in woody stems is later covered by the *outer bark,* or *corky bark,* which is generally heavy, rough or corky, and usually dead. It protects the living inner portions. It does not contain green coloring matter, but gives the stems and twigs their red, purple, brown or light gray color.

In some trees like the birches, the sweet-gum and the cork-oak, the corky bark grows and forms new layers year by year, but the older bark dies and falls away until, on very old trunks, only the inner bark remains. That inner bark adds new layers each year, from within. The outer bark, not being able to stand

the strain of the enlargement due to inner growth, then stretches and tears. That strain, together with the action of sunshine and rain, causes the rough, tattered appearance of old tree trunks.

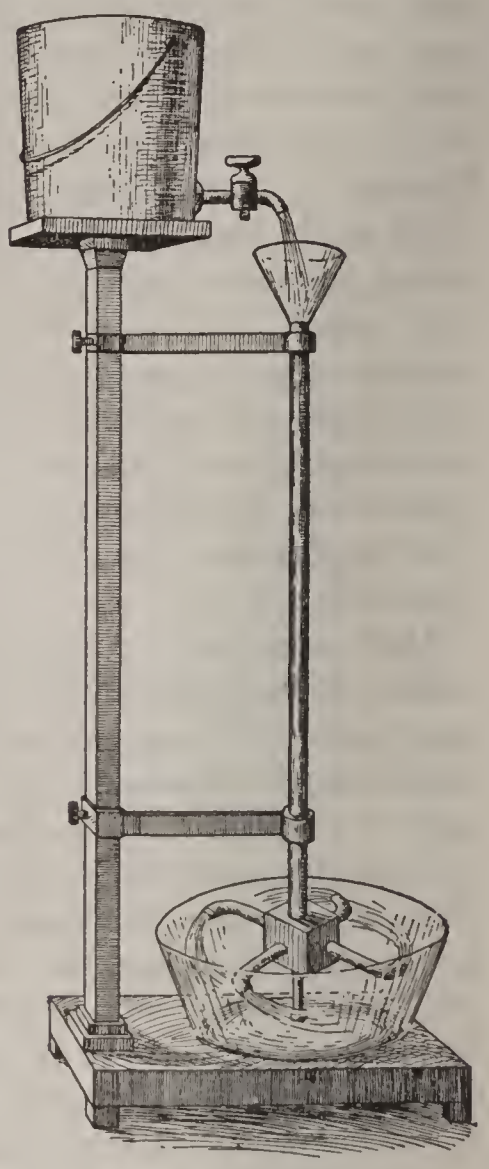
When a tree is chopped down and cut straight across, a number of quite distinct rings will be seen in the wood, one within the other. These rings show the fresh yearly growths of the inner bark and by counting them the age of the tree can be ascertained.

Early man used barks for most of the necessities of life. Some were made into clothing and shelter; others furnished fire. Some were made into weapons or canoes; others furnished valuable medicines. Many of these uses have been repeated from generation to generation until the present time.

Some barks are valuable in commerce. Cork is gathered from the outer layer of the bark of certain oak trees. Tannic acid, the substance which is valuable in tanning leather, is obtained from the bark of hemlock and other trees. Quinine is made from Peruvian bark; cough mixtures from cherry bark. Bark is the source of the cinnamon of commerce, a popular flavoring; and the bark fibers of hemp, flax and other plants are made into threads, ropes, mats and cloths.

Injurious Insects. The rough bark of trees furnishes a home for insects, many of which are injurious to plant life. The insect enemies of the apple, alone, are estimated at over 300. These destructive insects are well represented by the San Jose scale, which attacks the inner bark. Elm trees are especially subject to attacks of injurious insect pests. In many localities folded burlap bands of cloth are put around parts of the trunks of these trees. Insect grubs crawl into the bands and can in that way be removed and destroyed in large numbers. Another serious pest is the bark beetle, which burrows between the bark and wood or makes a tunnel through the wood. In these crevices the female deposits her eggs. Both mature and young insects are very destructive. See INSECTS; SAN JOSE SCALE; APPLE, subhead *Destructive Insects.* M.S.

BARKER'S MILL, a mechanical device invented near the end of the seventeenth century by a Dr. Barker, to illustrate the principle of reaction (see DYNAMICS). It consists of a vertical tube supported by an arm which attaches it to a vertical support. On the lower end of the vertical tube is a hollow block, from which short, curved arms extend. The outer openings of these arms all face in the same general direction. The contrivance is mounted on a frame so that it can rotate about the vertical axis. When water rushes into the vertical tube from the reservoir, the reaction caused by the discharge of the water jet from the orifices in the arms causes each arm to move backward and thus makes the apparatus revolve. This device is used extensively in automatic lawn sprinklers, automatic sprinkler systems for business buildings, and other forms of apparatus for throwing water.



BARKER'S MILL

BARLEY, a grain fifth in importance among the world's cereals, being greatly exceeded by oats, wheat and corn, and slightly by rye. Barley does not differ greatly from wheat. It was known among all ancient peoples; in *Deuteronomy* we read that the Promised Land was a "land of wheat and barley." The sacred books of China mention that it was cultivated in that country twenty centuries before the beginning of the Christian Era.

Barley is grown over a wider area than any other grain, for profitable cultivation is possible from the equator to 70° north latitude. A very high quality is grown in Canada, where the crop averages 45,000,000 bushels yearly. In the United States about 200,000,000 bushels are raised in a year; North Dakota, Minnesota, California, South Dakota, Wisconsin and Iowa lead in its production. In the United States it ranks fourth among the grains, and in Canada is third in importance.

Cultivation. In the United States, Canada and most parts of Europe barley is usually sown in spring, after danger of severe frosts is over. But this grain is more suited to cold latitudes than any other. The coarser varieties,

some of which are mere grasses, are cultivated where no other cereal will survive. Winter crops are raised in warm regions. To obtain the best results, the soil on which barley is planted should be porous, well drained and fertile. The land should be thoroughly prepared for the seed by plowing the season before. Fertilizers containing large quantities of nitrogen should not be used. Barnyard manure is the best fertilizer for barley. Two or three bushels of seed per acre are sown broadcast, or preferably in drills. If barley follows a hoed crop, like corn, better yields are obtained. Thirty-five or forty bushels per acre is considered a good yield, but sixty bushels or more are obtained under very favorable conditions.

BARLEY

As barley ripens before spring wheat, it is usually harvested just before that crop. The exact time, however, depends upon the soil and climate conditions, and the use to which the grain is to be put. When the grain can be just dented with the nail, it is ready for harvesting, unless it is desired for brewing purposes. For that use it should be dead ripe. As soon as dry enough, the grain should be taken under cover, as rain or dampness discolors it and lessens its value.

Insect Enemies and Diseases. Although much less liable to disease than other cereals, it is attacked by smut and rust (see RUST; SMUT). The Hessian fly (which see) also occasionally does damage to barley crops. In America, loose smut is the most serious of barley diseases. It darkens the grain and scatters out in the form of black dust. The grain heads are then left empty. To prevent the disease, the seed before planting should be soaked in cold water for five hours, then in water at a temperature of 125° F. for fifteen minutes. The seed should then be sown on clean land. When the grain is attacked by close smut, the seed should be soaked for ten minutes in a solution of bluestone, one pound to five gallons of water, or formalin, one pint to thirty gallons of water.

Uses. Barley is used as a food for both man and beast and for malting purposes; as a food its use is decreasing among most nations, although it yet serves as a coarse bread for millions of the peasants of Europe.

Pearled barley, which is the polished grain, is used with other ingredients in preparing food for babies and invalids. A drink prepared from it, called barley water, is given to infants with intestinal disorders. Scotch barley is the grain from which the husk has been removed at a mill. Barley is also used for thickening soups. When malted it is used as a preparation for spirits and beer. The percentage composition of barley, for feeding purposes, is starch, 69.8; ether extract, 1.8; water, 10.9; proteids, 12.4; ash, 2.4; crude fiber, 2.7. It is used in many parts of the United States and Canada as a forage crop, being sowed with peas and vetch. See GRAINS; BREWING. M.S.

BARMECIDE'S, *bahr' me sidz,* **FEAST,** a very common phrase, which had its origin in the *Arabian Nights* story of the barber's sixth brother, and is used now to describe an imaginary feast. In the story the barber's poor and hungry brother is invited by a prince of the Barmecide family to a feast. Only empty dishes are put before him, but his host constantly asks him how he likes the food. The jolly beggar praises it all, especially the wine, which he declares is so heady that it intoxicates him. In this pretended intoxication he boxes the ear of the Barmecide, who laughs heartily at the joke and has a real feast set before him. See ARABIAN NIGHTS ENTERTAINMENT.

BAR'MEN, one of the most prosperous cities of Germany, famous for the manufacture of ribbon, in which it is the leading city of the Continent. It is situated on the Wupper River, twenty-five miles northeast of Cologne. The town comprises several small villages extending along the valley, and on the west it joins the town of Elberfeld. The river flows through the center of the town and is crossed by about twenty bridges. Among the important buildings are a beautiful and modern town hall and a municipal theater; there are also a number of institutions for higher education, a municipal hospital, a museum of natural history, a library and an art gallery. All public utilities including gas works, electric lighting and water works are municipally owned and are profitably conducted.

Barmen manufactures cotton and woolen fabrics, linens, silks, laces, soap, candles, machinery and musical instruments; the calico printing establishments here are noted for the superiority of the dye called Turkey red. Population in 1919, 156,326.

BARN, the principal building of a farm, except the residence of the family, is, in the strict sense of the word, only a shelter for hay

and grain. But in America it is frequently also a stable for horses and cattle.

The remarkable progress of the last few years in methods of agriculture is producing radical changes in type and construction of barns. Many farmers build everything just as their fathers and their grandfathers did, and it is sometimes difficult to convince them that any other way is better. Naturally the most extreme changes in barn architecture have been made by wealthy men for whom farming is a diversion rather than an occupation, who employ architects to design their buildings and who have little regard for expense. Many of the ideas which such men have developed have been found to be very practical, and, together with those improvements which the agricultural schools have devised, are worthy the study of any progressive farmer.

The Cow Barn. On large estates this a separate structure but more commonly it is a section of a larger building. In the latter case it is advisable to have it in a wing, so that it may receive light from three directions. It should be on the south side, for the sake of winter sunshine and shelter from north winds. Cleanliness is essential. For this reason floors or interior walls of wood are very undesirable. A wooden building may be covered on the inside with metal lath and the lower four feet of each wall plastered with a rich Portland cement such as that with which floors are finished. The balance of the wall may be covered with hard plaster. All corners should be rounded, and no dust-collecting ledges or panels should be allowed in doors and windows. Cement floors are the most sanitary; they must be set in dry earth and sloped for drainage. Where cattle walk the floor should be finished roughly, to prevent slipping. Hay and feed must be kept where their dust cannot reach the milking cows, and away from the stable fumes. Light is such a valuable purifying agent that there should be as many windows as possible, though in summer they may have to be covered with blinds to make the stable unattractive to flies. Cement walls make a room lighter than wooden walls, but their cool surfaces repel the flies.

Ventilation is extremely important. In the system devised by Professor F. H. King of the University of Wisconsin, there are galvanized iron inlet pipes in the walls, which take air from near the ground at the outside and admit it to the stable near the ceiling. An outlet may be built like a chimney, reaching from very near the floor to a number of feet above the peak of the roof. It is covered over, but has plenty of side openings into the outer air. As a result of this system of ventilation the warmest outdoor air in winter is admitted to the ceiling and the heaviest gases of the stable are drawn off from the floor. For twenty cows the outlet should be two feet square.

The old-fashioned, high-boarded stall prevents circulation of air, and the best stalls have just one iron bar at each side. Concrete is too cold for the floor of a stall, but a number of things are considered better than wood, among them cork bricks.

The Horse Stable. Most of what has been said about cow barns applies also to those for horses, for whom cleanliness is as desirable if not as necessary as for the milk-producing animals. Windows in front of the horses should be at least six and a half feet above the floor, so that light will not shine in the animals' eyes. Horses do not require as much warmth in winter as cattle, so ventilation may often be achieved with windows.

The Hay Barn. In this structure few changes have been made from the old-fashioned, gambrel-roof barn. The principal improvements have been additions in ventilation and alterations in framing so as to do away with beams and posts. There should be vents in the roof, under the eaves and at the ends of the barn, all covered with galvanized iron netting to keep out birds. In determining the size of a hay barn, allow space for two tons of hay for each animal. A ton of loose hay occupies 500 cubic feet; a ton of baled hay may be put into 150 cubic feet. C.H.H.

BARNABAS, *bahr' na bas,* a fellow worker with Paul, and, like Paul, ranked as an Apostle. Barnabas was the family name given to him, his first name being Joseph. Luke makes the name mean *son of consolation.* Barnabas was known for his sweet spirit; "He was a good man, and full of the Holy Ghost and of faith" (*Acts* XI, 24). He accompanied Paul on his first missionary journey, and they labored a year together in Antioch, where the Disciples were first called Christians. Little is known of his later life.

BARNACLE, *bahr' na k'l,* a tiny salt-water shell-fish, related most nearly to the crab and the shrimp. The barnacle shell has five important valves and several smaller pieces, all joined by a membrane. A muscular stalk, long, flexible and fleshy, enables it to attach itself to a quite smooth surface, and all timbers or

piles beneath the water and the bottoms of wooden ships soon become covered with barnacles.

The young barnacle just hatched from the egg is a little, six-legged, free-swimming animal, with a single eye. In its next stage it has six pairs of swimming feet, two compound eyes and two large feelers, and is still independent and free-swimming. In its third or adult stage, it attaches itself to a stone, pile or ship's bottom, loses its eyes and feelers, develops a hard shell and loses all power of locomotion. Its swimming feet become clinging or grasping organs.

At quite regular intervals ocean vessels must enter drydock to have the accumulation of barnacles cleaned from their bottoms; this is particularly true of wooden ships. All barnacles are salt-water animals, except one rare species which lives in brackish fresh waters. The salt-water species feed on small marine animals brought within their reach by the water and secured by their tentacles. Some of the larger species are edible. According to an old fable, these animals produced barnacle geese.

VARIOUS FORMS OF BARNACLES

Barnacle Goose. This name is applied to a wild goose common in Northern Europe, particularly in the North Sea adjacent to the Scandinavian Peninsula. Its forehead and chest are white, and the upper body and neck black. The name is due to the ancient absurd belief above referred to.

BAR'NARD, Frederick Augustus Porter (1809-1889), an American educator for whom Barnard College, an institution for women, connected with Columbia University, New York City, is named. He was born at Sheffield, Mass., and educated at Yale College. He began his career as a teacher of the deaf and dumb, but in 1848 became professor of natural philosophy and mathematics in the University of Alabama. In 1856 he was elected president of the University of Mississippi and in 1864 became president of Columbia College (now Columbia University), in New York City, a position he held twenty-four years. Barnard was United States commissioner to the Paris Exposition in 1867 and was also associated with the United States Coast Survey. At his death he left most of his property to Columbia College. He edited, in 1872, Johnson's *Universal Cyclopedia,* and was the author of *A Treatise on Arithmetic, Letters on Collegiate Government* and *Recent Progress in Science.*

BAR'NARD, George Grey (1863-), one of the most distinguished of American sculptors, whose reputation is even greater abroad than at home. He is not what could be called a popular artist, for his work is so original as well as idealistic that it does not always make an immediate appeal. Some of his productions, as the well-known *Two Natures,* marvelously executed as they are and from that standpoint entirely satisfying, are so mysterious in their symbolism that they do not disclose their meaning to the closest observer. In this great work, which is in the Metropolitan Museum of Art, in New York, and which the artist calls in full *I Feel Two Natures Struggling Within Me,* the struggle is indeed shown, and the victor is clearly evident, but nothing in face or figure shows which nature—whether wrong or right—is triumphant. It is the sense of power, of irresistible force behind the Titanic figures, which, even more than the superb modeling, makes the work great. Others of Barnard's works are a great group, *Brotherly Love,* for a tomb in Norway; *The Boy; Maidenhood; The Urn of Life,* which includes nineteen figures in marble; the *God Pan,* in bronze, on the green of Columbia University, and the sculptures for the state capitol of Pennsylvania.

Barnard was born at Bellefonte, Pa., studied at the Art Institute in Chicago and the School of Fine Arts in Paris, and before his return to the United States in 1895 had won a very favorable reputation by sculptures exhibited in the

Paris Salon. He received gold medals at the Paris Exposition of 1900 and at the Pan-American Exposition of 1901, and was professor of

BARNARD'S *TWO NATURES*

sculpture in the Art Students' League. Of recent years he has built in upper New York a museum called "The Cloisters," plain and barn-like without, but within a fit setting for one of the finest collections of sculptures in the United States. These, which are in large part of the French Gothic period, he discovered during his stay in France, excavating many of them himself.

BAR'NARD, HENRY (1811-1900), an American schoolman, the first United States Commissioner of Education and the organizer of the Bureau of Education, whose work as an educational reformer places him next in rank to Horace Mann. He was born in Hartford, Conn., was graduated at Yale, and began the practice of law in 1835. While a member of the Connecticut legislature he became interested in school reform, and his work along this line attracted such attention that he was asked to examine the public schools of Rhode Island. After completely reorganizing the school system of that state, he returned to Connecticut to become superintendent of the state schools and principal of the state normal school at New Britain.

From 1857 to 1859 he was president of the University of Wisconsin, and in 1865 he became the head of Saint John's College, Annapolis, leaving the latter position in two years to become the first Commissioner of Education of the United States. Besides laying the foundation for the Bureau of Education, he issued a number of circulars of far-reaching influence. These treated of the educational land policy of the United States, the constitutional provisions for education in the several states, elementary education, secondary education, the establishing of high schools, of agricultural colleges and of professional schools, and the training of teachers. One series of these circulars compared the educational system of the United States with those of Switzerland and Prussia, and contained recommendations for the reorganization of the elementary schools in the United States on the graded plan. These recommendations contain the foundations of the public-school system of the several states as it exists to-day.

BARNARD COLLEGE, a department of Columbia University, New York City, constituting the university's undergraduate school for women. President Barnard of Columbia, for whom the college is named, tried in vain to have Columbia made a coeducational institution; the new college was established to supply the need. There were no funds and no promise of them, but the hopeful founders felt certain that these would come when the school had proved its worthiness, and their faith and patience were justified. To-day Barnard has buildings and grounds valued at $3,000,000, and an endowment of $1,300,000, for most of which it is indebted to women. It has approximately 900 students, to whom degrees are granted in the name of Columbia University. The president of Columbia is president *ex officio* of Barnard, but the latter has its own board of trustees and its own instructors. See COLUMBIA UNIVERSITY.

BARNUM, PHINEAS TAYLOR (1810-1891), an American showman who made several fortunes through his belief that "the American people like to be humbugged." He was not dishonest; he frankly admitted the character of many things he exhibited, but he had early learned that an air of mystery thrown around an exhibit increased the desire to view it. He was the son of a tavern-keeper of Bethel, Conn., and from

PHINEAS T. BARNUM

the time he was thirteen worked for his living. At the age of eighteen he went into the lottery business; in the next year he married secretly and soon began to edit the Danbury *Herald of Freedom*.

In 1834 he removed to New York, where he entered upon his first venture as a showman, buying Joice Heth, the reputed colored nurse of General Washington, and exhibiting her with considerable profit. After 1839 he was reduced again to poverty, but in 1841 he bought Scudder's American Museum in New York, through which he became at once prosperous by exhibiting various fraudulent freaks and curios, and also a noted dwarf (Charles S. Stratton of Bridgeport), whom he styled Gen. Tom Thumb. In 1847 he offered Jenny Lind $1,000 a night for 150 nights, and received $700,000—the concert tickets often being sold at auction, in one case as high as $650 for a single ticket. In presenting this marvelous singer to American audiences he performed a distinct service to music lovers (see LIND, JENNY).

Soon, however, he was again bankrupt, but immediately entered upon new enterprises and made another fortune. His greatest venture was his traveling museum, menagerie and circus, known as the "Greatest Show on Earth," which required 500 men and horses and 100 railroad cars to transport it. He paid $10,000 to the London Zoölogical society for the huge elephant, "Jumbo." This traveling circus was the forerunner of the later great traveling companies of like character. Barnum published several books, including an autobiography, which tells frankly of many of his audacious frauds.

BARODA, *ba ro' da,* an important city of India, a trade center for the surrounding country, which has an abundant yield of grain, flax, cotton and tobacco. It is also the capital of the state of the same name, and is a fortified city, situated 248 miles north of Bombay. There are several fine buildings and educational institutions. Since 1802 the state has been tributary to Great Britain, but is nominally governed by a native ruler called the *gaekwar,* one of the richest and most powerful of Indian potentates. Population of the state is 2,121,875; of the town, 94,742. in 1921.

BAROMETER, *ba rom' e ter,* an instrument for recording atmospheric pressure, used chiefly in forcasting weather and in measuring heights of mountains (see AIR). If you take a glass tube something over thirty inches long and closed at one end, fill it with mercury, put your thumb over the open end as shown in Fig. 1 *a* and insert this end in a cup of mercury as in Fig. 1 *b,* the liquid in the tube will fall until its top is only about thirty inches above the surface of the liquid in the cup. If you were to admit air to the vacuum above the mercury by breaking open the top of the tube, the mercury would fall until it reached the same level in the tube as in the cup. So long as the tube remains air-tight there is no weight pressing on the mercury in it, and the fluid is thrust upward by that in the cup, which is under pressure from the atmosphere. This is the experiment which Torricelli, a pupil of Galileo, made in 1643; from it he learned that the weight of all the air above any point is equal to the weight of a column of mercury about thirty inches high. See TORRICELLI.

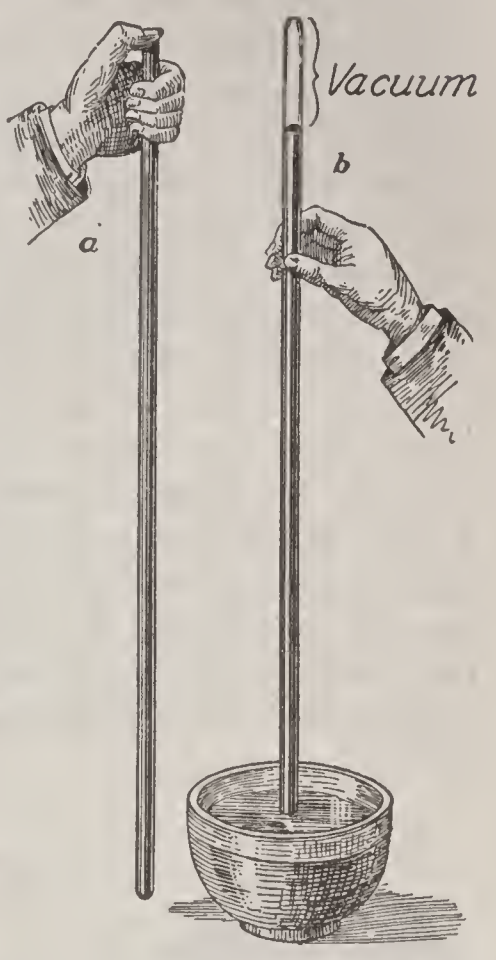


FIG. 1

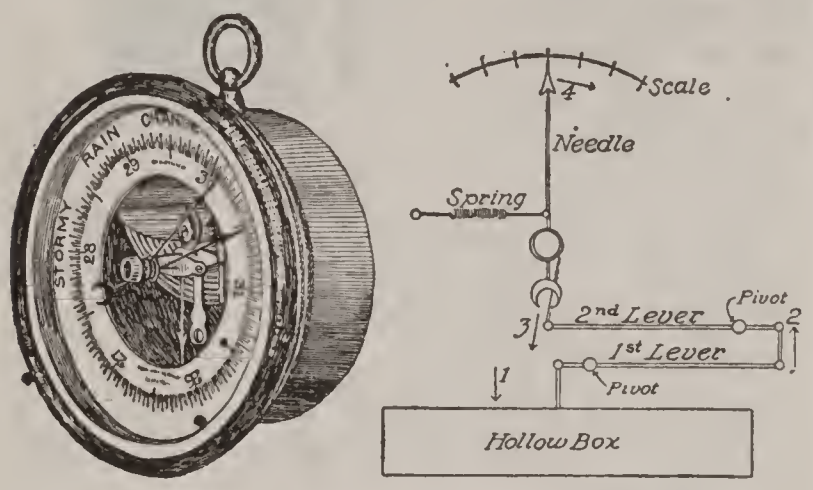
Measuring Altitude with a Barometer. Not long after Torricelli's experiment was first performed, scientists realized that if it were truly the weight of the air which supported the fluid in the tube, the mercury would fall farther upon a mountain top, where there was less air above it. Pascal proved this to be true, and the mercury tube was given the name *barometer,* which means *pressure-measure.* Since then barometers of all sorts have been helpful in measuring heights, and when you read that an aeroplane pilot has reached a height of 10,000 feet you may know that this figure was learned from his barometer.

The Barometer and the Weather. The barometer has made possible the modern science of weather predicting. When the mercury falls rapidly a storm is quite sure to follow, while a "rising barometer" foretells fair weather. And, by drawing upon a map *isobars* or lines of equal atmospheric pressure (*iso* means *equal* and *bar* means *pressure*), the probable course of winds and storms can be learned. More about this

will be found in the article WEATHER BUREAU.

Different Kinds of Barometers. The barometer in Fig. 2 is exactly the same in its principle as the tube and cup in Fig. 1, but is fitted with appliances to assist accurate reading. By turning the thumbscrew at the lower end, the bottom of the mercury chamber can be raised or lowered so that the surface of the fluid in the reservoir will be level with the zero mark of the scale. Such an adjustment is necessary because this surface rises whenever the mercury in the tube falls, and falls when the latter rises.

Barometers can be made without mercury; Pascal filled one with wine, but it had to be forty-six feet long, because wine has little weight. Barometers built without any liquid at all are called *aneroid,* which means dry. They are not as accurate as mercury instruments, but indicate much slighter changes in the atmosphere. An aneroid barometer is shown in Fig. 3.



ANEROID BAROMETER
(Fig. 3)

An aneroid barometer may be made to preserve a record of changes in the weather by fitting the end of the pointer with a pen, which draws a line upon a slowly passing paper. A mercury barometer will perform the same task through continuous photography. C.H.H.

BARON, *bair' un,* the title held by noblemen in the lowest rank of the British peerage. It was introduced into England at the time of the Norman Conquest (1066), when it was applied to those who received grants of land from the king in return for military services. The barons eventually became divided into "greater" and "lesser" barons, according to the amount of land held. They gradually assumed considerable power; their grants of land were considered hereditary and were handed down from father to son, thus establishing the feudal aristocracy.

Fig. 2.—Standard Mercurial Barometer. Scale at left is marked in inches; at right in centimeters.

(Fig. 2)

The greater barons became earls or dukes, with the lesser barons as their retainers (see EARL; DUKE). The title of baron is now conferred by the king, usually for distinguished service or in recognition of distinction in art or letters; the holder is addressed as "Lord" and is entitled to a seat in the House of Lords.

Baronet. A title taking rank between that of baron and knight is that of *baronet.* King James I, when sorely in need of money, introduced this title to be sold to a limited number of persons. The king's need of money was such, however, that the limit was very elastic. The title is now conferred by the king on those he wishes to honor. It is hereditary, but does not entitle the holder to a seat in the House of Lords. A baronet is addressed as "Sir."

BARR, AMELIA EDITH HUDDLESTON (1831-1919), a popular American novelist whose reputation was not established until she was past fifty years of age, and who has since then written about sixty books. She was born in England and educated in that country and in Scotland, emigrating to the United States in 1854, four years after her marriage. In 1867, while living in Galveston, Tex., she lost her husband and three sons in a yellow-fever epidemic, and it was the urgent need of earning a living for herself and three daughters that caused her to take up writing as a profession.

She removed to New York City in 1869, and for

years toiled away on miscellaneous work—advertisements, circulars, short articles, verses, etc.—learning to write by writing, and seeing the end of her apprenticeship in 1884, when a leading publishing firm accepted her *Jan Vedder's Wife,* the book that secured for her the place she now holds among American writers.

Jan Vedder's Wife, one of Mrs. Barr's most characteristic tales, a vigorous story of life in the Shetland Islands, has been translated into many different languages. Others of her novels have an historic background, as *The Border Shepherdess,* the scenes of which are laid in the borderland between England and Scotland; *The Bow of Orange Ribbon,* a tale of New York during the period of Dutch supremacy; and *Friend Olivia,* a story of the English Commonwealth. Among her latest novels are *The Hands of Compulsion, The House on Cherry Street* and *Sheila Vedder.* One of Mrs. Barr's most marked traits is the charm and clearness with which she presents primitive and wholesome types of characters. She has written an interesting autobiography, *All the Days of My Life.*

BARR, Robert (1850-1912), a British novelist whose vigorous and animated stories have gained for him a wide circle of readers. He found much of the material for his scenes and characters both in the United States and in Canada. He was born in Glasgow, Scotland, and educated in Toronto, Canada, later becoming headmaster of the Central School of Windsor, Ontario. In 1876 he was on the staff of the *Detroit Free Press* writing under the name of "Luke Sharp," and five years later was sent to London to establish an English weekly edition of that paper. During his residence in England he became associated with Jerome K. Jerome (which see), in the founding of the *Idler,* a monthly magazine. Barr's first novel, *In a Steamer Chair,* was published about the same time.

His narratives are full of life and action, and with him the important thing is to tell the story, while the portrayal and development of character is a secondary matter. One of his most popular novels, *In the Midst of Alarms,* is a story of the Fenian raid in Canada in 1866. Other well-known titles are *Countess Tekla, The Face and the Mask, A Prince of Good Fellows* and *The Palace of Logs. The Unchanging East* is a series of travel sketches.

BARRANQUILLA, *bahr ran keel' ya,* is the chief commercial city of Colombia, South America. It is in the extreme north of the country, on the Magdalena River, near its entrance into the Caribbean Sea. The river is navigable for many miles from Barranquilla (although not at its mouth) and is the principal artery for the interchange of inland produce and for the distribution and collection of imports and exports. Barranquilla is connected by rail with Sabanilla, a seaport fourteen miles northwest, and exports principally coffee and hides. The town was founded in 1629 but did not become of any commercial importance until the nineteenth century. In 1912 the population was 48,900.

BARRAS, *ba rah',* Paul Francois Jean Nicholas, Count de (1775-1829), a French statesman who bore a prominent part in the French Revolution of 1789. Though descended from a noble family, he eagerly took up the cause of the Revolutionists, joined the mob that stormed the famous old prison known as the Bastile (which see), and also took part in the attack on the royal palace of the Tuileries. As a member of the National Convention he voted for the death of King Louis XVI in 1793. For some time thereafter Barras exercised great power. He became president of the Convention, helped to bring about the overthrow of Robespierre and other leaders in the Reign of Terror, and in 1795 was nominated one of the five members of the Directory. To him Napoleon owed his appointment as commander-in-chief of the army in Italy. While the Directory was in control of affairs the authority of Barras was unquestioned, but when the Directory was replaced by the Consulate, in 1799, he was forced to yield his power to Napoleon, and to leave Paris. He afterward resided at Brussels, Marseilles, Rome and Montpellier, constantly watched by the police, and returned to Paris only after the Bourbons were restored. His memoirs are of great importance as a source of information concerning the French Revolution. See Robespierre; Directory; French Revolution.

BARRE, *bair' ee,* Vt., leads the world in the production of fine granite for monuments. It is situated in Washington County, northeast of the geographical center of the state, on the Winooski River. Montpelier, the capital, is six miles northwest; Boston is 214 miles southeast. The Montpelier & Wells River Railway, a division of the Boston and Maine system, serves the city, and there is trolley connection with Montpelier. The first settlement was made in 1788, and the town was organized in 1793 as Wildersburg; the name was changed

to Barre in honor of Isaac Barre, a defender of American rights in the British Parliament. In 1894 the city was incorporated and made independent of the town of Barre, but the interests of town and city are closely interwoven. Scotch and Italians predominate in the foreign element of the population, which decreased from 10,734 in 1910 to 10,008 in 1920. The area is four and one-half square miles.

The quarrying and cutting of granite has made Barre one of the leading industrial centers of New England. There are more than 100 granite quarries and establishments; these employ about 4,500 men and have an annual output worth about $4,000,000. Granite-cutting tools, granite-polishing machines and derricks are manufactured here. In addition to its public schools Barre has Goddard Seminary and a $90,000 public library. The Federal building, completed in 1912 at a cost of $125,000, a $100,000 city hospital and a $125,000 hotel are the noteworthy buildings. The public square contains an imposing granite statue of Robert Burns, erected by the Scotsmen of Barre. Three miles southeast of the city is Millstone Hill, a huge mass of finest granite. H.A.P.

BARREL, a vessel made of pieces of wood called *staves,* bound together by metal or wooden hoops. The *staves* are wider in the middle than at the ends, causing the barrel to bulge in the middle. This shape has been found most suitable, giving increased strength, though causing a waste of space in shipment. The top and bottom, called *heads,* are formed by circular boards which fit into grooves near the ends of the staves. When used for liquids, a hole is bored in one end, through which to fill and empty the barrel; this hole is called a *bung,* a name also given to the cork or plug used to fill the hole to preserve the contents.

For many centuries barrels were made entirely by hand, but now labor-saving machinery is employed. The barrel as a measure has many different meanings. In England a barrel of wine contains 31½ gallons; a barrel of beer, 36½ gallons—though for convenience beer is usually sold in 4½, 9 and 18-gallon kegs. Canada adheres to what is called the imperial standard; a wine barrel contains 26¼ gallons; an ale barrel, 31½; beer, 36½ gallons.

In the United States a standard measurement for barrels was established for the first time in 1915. The law provides for a barrel with 21½-inch staves, 17⅛-inch heads, and the material must not be more than $\frac{4}{10}$ of an inch in thickness. The capacity must be 7,056 cubic inches. A barrel having that capacity, whether its measurements agree with those stated or not, may be considered as standard. To sell what is stated to be a barrel of any commodity in a vessel of less than 7,056 cubic inches capacity is an offense punishable by a fine of $500, or six months' imprisonment.

The workmen who construct barrels from previously measured staves which are sawed into shape are called coopers, and the name of their trade is *cooperage.* When all barrels were made by hand cooperage was an excellent trade for a young man to learn; workmen were paid by the piece, and rapid assemblers could earn good wages. However, the advent of machinery has nearly destroyed this trade, except in country districts.

BARRETT, *bair' et,* Lawrence (1831-1891), an American actor whose best work was done during a memorable association with the famous Edwin Booth. He was born in Paterson, N. J., and made his first appearance on the stage at Detroit, Mich., in 1863, as Murad, in the drama, *The French Spy.* In 1861, at the beginning of the War of Secession, Barrett for a time served as captain of a company of Massachusetts infantry. After his retirement from the army he returned to the stage, taking important rôles in Edwin Booth's company and varying his work with the management of theaters in New Orleans and San Francisco.

He acted successfully in England during a short visit there in 1884. Three years later Barrett became again associated with Booth and remained with him until his death, playing Othello to Booth's Iago, and Cassius to his Brutus, and interpreting many other Shakespearian rôles with distinction. Though he had not the genius of Booth, nevertheless his acting had high intellectual quality. His *Life of Edwin Forrest* and a sketch of Edwin Booth are admirable.

BARRIE, *bair' ie,* Sir James Matthew (1860-), a Scotch dramatist and story-writer, of quaint and delicate humor, tender pathos and poetic fancy, whose fairy play, *Peter Pan,* is undoubtedly one of the best-loved dramas of all time. He was born in Kirriemuir, Scotland, and soon after his graduation from Edinburgh University, in 1882, began to find a loyal reading public for his sketches and stories. In 1885 he removed to London, and by 1900 had become one of the most popular writers of his time. King George V made him a baronet in 1913.

Auld Licht Idylls and *The Window in*

Thrums, picturing the every-day life of the Scotch people, with their quaint speech and customs, are classics among books of their kind, and display admirably the author's peculiar genius. *The Little Minister* established his fame; *Sentimental Tommy* and *Tommy and Grizel* reveal not only his gift in the portrayal of character, his engaging humor and his tender touch in writing of the pathetic, but also his appreciation of romance. Barrie's love for child life comes out clearly in *The Little White Bird,* a book of special interest because it introduces Peter Pan, the boy who would not grow up, and whose story was expanded into the play that makes grown-up people children again. ***A Kiss for Cinderella*** appeared in 1921.

J. M. BARRIE

The plays of this author have the individual touch that makes them like no others, and they are as charming to read as to see on the stage. Many of them have become familiar to American play-goers through the sympathetic interpretation of Miss Maude Adams, whose Lady Babbie of *The Little Minister,* Maggie of *What Every Woman Knows,* Leonora of *The Legend of Leonora* and, above all, her *Peter Pan,* will not soon be forgotten. *Quality Street, The Admirable Crichton, Alice-Sit-by-the-Fire* and *The Will* are other successful plays by this writer. B.M.W.

BARRIE, ONT., the county town of Simcoe County, is sixty-four miles northwest of Toronto, on the Grand Trunk, the Canadian Pacific and the Hamilton & Northwestern railways. It is situated on Kempenfeldt Bay, at the western end of Lake Simcoe, and has steamship connection with Orillia and other towns on the lake. It is a favorite summer resort, but is more important as a manufacturing center. The principal manufactures are building materials, including bricks, flour, boilers, gas engines, leather, boots and shoes, wicker work and excelsior. Hydro-electric power is obtained from the Severn River at low cost. The Carnegie Library, a collegiate institute and a business college deserve mention. Population in 1911, 6,420; in 1920, 6,936.

BARRIER REEF, a chain of coral reefs off the eastern coast of Queensland, Australia, and extending from Cape Sandy to Torres Strait, a distance of about 1,250 miles. They are from ten to 150 miles from land. The sea between

LOCATION OF BARRIER REEF

the reefs and shore is quiet and affords a safe passage for steamers but is dangerous for sailing vessels. Pearls and pearl-shells are obtained from the reefs, which cover an area of about 100,000 square miles.

BARRISTER, *bair'ister,* in England, Ireland and some of the British colonies, the highest grade among lawyers, the word being derived from the word *bar.* A barrister is literally one who appears before the bar in the law courts and argues the case. This is his chief business, and in the higher courts only a barrister may appear for the client. A barrister who has been honored with the rank of *King's Counsel* (K. C.), takes precedence over the ordinary practitioners, who are called *utter* or *outer* barristers. A King's Counsel may stand within the bar of the court, but an outer barrister must stand outside. To become a barrister a man must be a member of one of the Inns of Court (which see), and must then pass an examination before he is "called" to the bar.

In Canada there is no formal distinction between barristers, solicitors, advocates, attorneys and other titles, but the honor of "K. C." is frequently given to Canadians. It is common for a lawyer to style himself "Barrister and Solicitor" in all the provinces except Quebec, where "Advocate" is preferred. The different functions of barrister and solicitor, however, are understood; though a man calls himself both, when he acts as legal adviser he is

acting as solicitor. In the United States the word barrister is now seldom, if ever, used. In its place the phrase "Attorney and Counsellor-at-Law" is common, and in general speech a member of the legal profession is roughly described as a lawyer.

BARRON, JAMES (1769-1851), a commodore in the United States navy who came prominently into public notice during the critical period before the War of 1812. In 1807, while commanding the *Chesapeake,* he was challenged by the captain of the British frigate *Leopard,* who demanded the surrender of several American sailors accused of being British deserters (see IMPRESSMENT OF SEAMEN). Barron's refusal to obey this demand was met by a broadside from the *Leopard's* guns, which killed three and wounded eighteen of the *Chesapeake's* crew. Barron thereupon hauled down the American flag and surrendered the suspected men, for which act he was court-martialed and suspended from rank and pay for five years. At the end of that term he was placed on shore duty. In 1820 Barron killed Commodore Decatur in a duel in which he himself was seriously wounded.

BAR'RYMORE, the name of a family of actors who represent the highest traditions of their profession. They are the children of Maurice Barrymore and Georgie Drew-Barrymore, and John Drew is their uncle.

Ethel Barrymore (1879-), in private life MRS. RUSSELL GRISWOLD COLT, was born in Philadelphia. Since 1895, when she first appeared on the stage, she has been successful. In 1897 she was engaged by Sir Henry Irving, the English actor, and as a member of his company appeared in many important parts. In 1910 she was starred in *Captain Jinks* and has since had ample opportunity to reveal the diversity of her talent in many plays, such as *A Doll's House, Alice-Sit-by-the-Fire, Cousin Kate, Mid-Channel, The Shadow* and *Our Mrs. McChesney.* Miss Barrymore's personality and accomplishments have made her a favorite.

John Barrymore (1882-), began his professional career in Chicago in 1903. Since then he has creditably upheld his family's reputation and has proved his versatility in varied rôles, including leading parts in *The Boys of Company B, Miss Civilization, A Stubborn Cinderella, The Fortune Hunter* and many other plays. In 1915 he was engaged as leading man with the Famous Players Film Company, and became a favorite with patrons of moving picture theaters.

Lionel Barrymore, brother of Ethel and John Barrymore, is well-known both on the stage and as an actor in moving pictures. He made his first appearance on the stage in 1893 and has played in *Arizona, The Second in Command, The Best of Friends* and *The Other Girl.*

BARTER, the exchange of one article for another without the medium of money. Among uncivilized people or in places remote from active commerce, barter has always been carried on. Natives of Africa and the islands of the south seas, following the custom of people of primitive times, are readily induced to barter such things as they possess in exchange for weapons, ornaments, cloth or food stuffs, which have definite value to them. When money is shown to them it has no specific meaning, for they cannot relate it to their experiences, but they do sense at once the value, to them, of a piece of merchandise.

BARTHOLDI, *bahr tol dee',* FREDERICK AUGUSTE, a great French sculptor, whose life story is summarized under the title LIBERTY, STATUE OF.

BARTHOLOMEW, *bahr thol' o mew,* the Apostle of whom Jesus said: "Behold an Israelite indeed, in whom there is no guile." Bartholomew is probably the same person as Nathanael, mentioned in the Gospel of Saint John as one of the first of the Disciples. Although there are many traditions concerning Bartholomew, such as his carrying the Gospel to India, but little is actually known of him.

BARTHOLOMEW'S DAY, SAINT. See SAINT BARTHOLOMEW'S DAY, MASSACRE OF.

BART'LETT, PAUL WAYLAND (1865-), an American sculptor, who first exhibited in the Paris *Salon* at the remarkably early age of fourteen. He was born at New Haven, Conn., and grew up in an artistic atmosphere, his father having been a sculptor and art critic. After studying in Boston he went to Paris, where in 1880 he entered the School of Fine Arts. Seven years later he attracted wide attention by his *Bear Tamer,* shown at the *Salon;* his *Ghost Dancer,* first viewed at the World's Columbian Exposition, showed astonishing skill. His later notable works include a statue of General Joseph Warren in Boston, an equestrian statue of General McClellan, and an equestrian statue of Lafayette, in Paris, presented to France by the school children of the United States. For the Congressional Library at Washington he produced a statue of Columbus and one of Michelangelo, and for the central entrance of the New York Public Li-

brary six great figures representing Fable, the Drama, Poetry, Religion, History and Philosophy. Chosen to adorn with sculptures the pediment of the east portico of the Capitol

"PEACE PROTECTING GENIUS"
One of Bartlett's group of figures on the Capitol at Washington, D. C.

at Washington, he designed for the purpose a group of figures representing the democracy of the United States as shown in its working people. Critics rank the production very high among works of this character.

BARTOLOMMEO, *bahr to lom may' o,* FRA (1475-1517), the name assumed by BACCIO DELLA PORTA, one of the principal painters of the Florentine school during the Italian Renaissance. He was born at Florence, Italy, and early came under the influence of the great Leonardo da Vinci. While engaged in painting some pictures for the convent of the Dominican friars, he became a fervent admirer and follower of Savonarola, and was so grieved by the untimely death of the great leader that he joined the Dominican Order and gave up painting for several years.

Persuaded at length by his superior to resume his work, he made the acquaintance of Raphael, who taught him the rules of perspective. Later, while on a visit to Rome, he saw the beautiful frescoes of Michelangelo in the Sistine Chapel, which worked a transformation in his art. Fra Bartolommeo's paintings are remarkable for their arrangement of light and shadow and rich and delicate coloring. He excelled, however, in the handling of drapery, and was the first to use the jointed model known as a lay figure. His best-known canvases are *Saint Mark,* his masterpiece, in the Pitti Palace at Florence; *Saint Sebastian* and *Marriage of Saint Catharine,* in the Louvre, Paris; and a portrait of Savonarola. (See the story of each artist named, in its place in these volumes.)

BAR'TON, CLARA (1821-1912), one of the most famous women America has produced, who devoted her life to the good of humanity, and whose most enduring achievement is the founding of the United States branch of the Red Cross Society. She was born in Oxford, Mass., educated in Clinton, N. Y., and became deeply interested in soldiers' relief work during the War of Secession. It was due to her that a bureau of records, to assist in the search for missing men, was organized. She herself named and marked the graves of over 12,000 soldiers in the Andersonville (Ga.) National Cemetery.

MISS CLARA BARTON
Revered founder of the Red Cross Society in America.

In 1869 Miss Barton went to Switzerland, where she came in touch with the members of the International Committee of the Red Cross. Encouraged by them, and inspired by the work of the Red Cross during the Franco-German War, in which she assisted, she returned to America in 1873, and began at once her successful efforts to bring about the organization of the American branch of the society. She became its first president, and held that position until 1904.

To Miss Barton, also, is due the honor of having originated the clause in the Red Cross constitution whereby the society may extend relief in calamities other than war, such as famines, floods, earthquakes and pestilence. She took charge of the relief work in the yellow-fever outbreak in Florida (1887), the Johnstown flood (1889), the Russian and Armenian famines of 1891 and 1896, in the Spanish-American and Boer Wars, and in the Galveston flood of 1900. The German emperor recognized her services by decorating her with the Iron

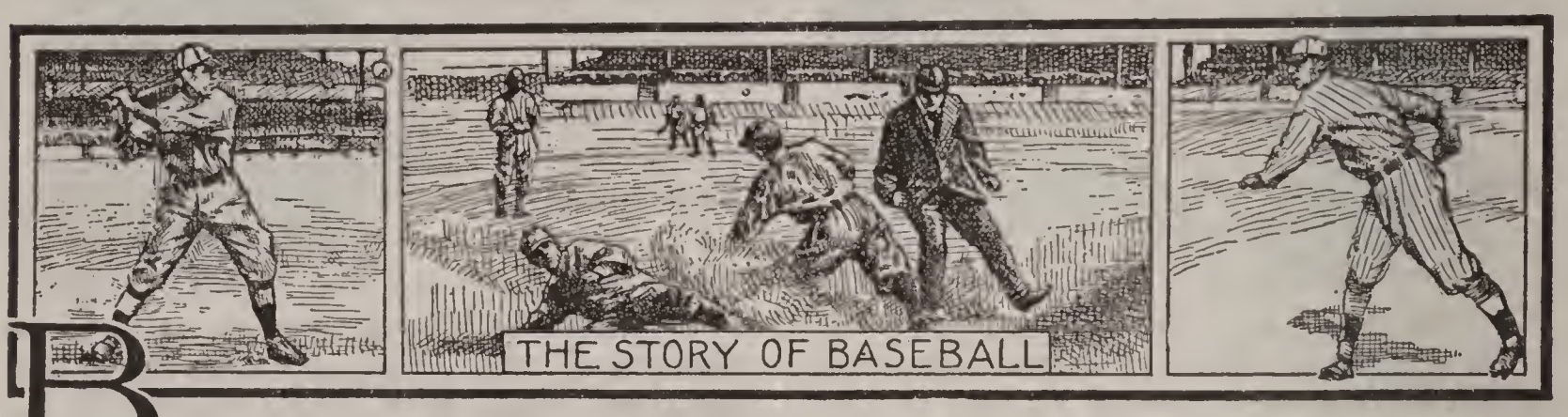
Cross of Germany. Miss Barton has written *History of the Red Cross, Story of the Red Cross* and *Story of My Childhood.* See Red Cross Societies.

BASALT′, a well-known rock formed by the action of heat and therefore one of the igneous rocks. It is fine-grained, heavy and crystalline, and is very common in regions that have been disturbed by volcanic action. Its tendency to crystallize in columns gives a peculiar character to the scenery. The columns are four-sided, six-sided, or eight-sided, and are usually jointed. Fingall's Cave on the island of Staffa, the Giant's Causeway, Ireland, and the cliffs along the Columbia River in Washington are noted illustrations of basaltic columns. See Igneous Rocks.

BASE, in chemistry, is a compound which will unite with an acid to form a salt. Bases are very soluble in water and are commonly known as alkalies. Most bases are solids. The metal of the base takes the place of the hydrogen of the acid. A base may be an oxide, as calcium oxide or lime, or a hydroxide (hydrate), as potassium hydroxide. The union of a base and an acid usually destroys the properties of both. In some cases, however, not all the hydrogen of an acid is replaced by the metal of a base, and the salt formed may have acid properties.

In mathematics, base refers to the third side of a triangle and the part of a pyramid or cone on which it rests; in percentage (which see), to the number on which per cent is computed. See Triangle; Pyramid.

In architecture, the base refers to the lowest division of a column or shaft (see Column; Architecture).



BASEBALL, the national game of the United States, is rapidly conquering the world. In Canada, though sharing in favor with lacrosse and soccer football, it is more popular every year. Cuba, too, has its professional teams, and a few Cubans have been members of teams in the "big leagues" of the United States. While William H. Taft was governor of the Philippine Islands, baseball was successfully introduced among the Igorrotes as a substitute for head-hunting. The Filipinos, Japanese and the Chinese in Hawaii already play, and the two last named do it nearly as well as the best American amateur teams. Lima, in Peru, and Caracas, in Venezuela, have clubs, and since the tour around the world of the Chicago "White Sox" and the New York "Giants" in 1913-1914 a baseball league has been established in New South Wales, Australia.

Strangely enough, war has been largely responsible for the spread of baseball. Before the American War of Secession the game was practically unknown, though growing, but thousands of soldiers learned the game while under arms, and afterwards played it in their communities. Again it was by soldiers that baseball was introduced to the Far East and to the Panama Canal Zone. During the War of the Nations many soldiers on temporary leave from the front watched the games of a three-club league on Saturdays in Paris. Hundreds of Italians who returned from America to fight for their country were baseball enthusiasts. Their interest and that of the soldiers of other nations is sure to revive the plans for adopting baseball, which in several of the European countries were halted by the war. Many people seriously believe that an international league on the Continent would establish international friendships and do much to prevent future wars. There is no doubt that the football contests between France and Great Britain in recent years were responsible for much of the mutual friendship of those two countries which the war intensified, and baseball, a game for all classes, should be a much stronger influence.

Baseball as a Science. Though the word *professional* in many other sports carries with it an inference of the undesirable, in baseball it stands for scientific athletics. So keen is the

play of teams in the professional leagues and so nearly perfect the defense of the players in the field that their opponents know the difference between a successful and an unsuccessful attempt at scoring to be a matter not of seconds, but of fractions of a second. The knowledge of strategy and of psychology which both sides employ would enlighten some generals.

Each pitcher and catcher knows the individual peculiarities, abilities and weaknesses of opposing batters, and the pitcher who throws the kind of a ball that the batter least expects is the one who wins games. The batter on his side must know the very few places he can hit the ball where it will not be caught in the air or thrown to first base before him. One who makes three safe hits in ten times at bat ranks with the best. Base running is perhaps the most scientific feature of the game. If a runner starts from first base to steal second just as the pitcher throws to the catcher, he is pretty sure when he arrives there, three seconds later, to find that the catcher has thrown the ball to someone at second base in time to put him out. If he has a lead of a few feet and a start from first base when the ball is thrown he may just win the race with it, but if he is too daring he is apt to be put out by a sudden throw of the pitcher to the first baseman. The instant the ball is hit fielders dash for the proper spot to catch or stop it. Almost before the spectators realize the ball has met with a bat, a fielder may be many yards on his way. He throws it to the proper base almost with the same motion that intercepts it, and with machine-like accuracy to which a distance of two hundred feet seems no hindrance.

Almost perfect physical control marks the best players. The pitcher who can "pull himself out of a hole" into which his own or his teammates' errors have put him, and the batter who can hit safely in an emergency, are sure of success.

Organized Baseball. There are in the United States two *major leagues,* the National, founded in 1876, and the American, its rival since 1900. Each league has eight teams, or clubs, which play almost daily from April to October. The two pennant winners are then matched, and the club winning four games is declared the world's champion team. A third league, known as the Federal, was organized in 1913, with a circuit of six clubs, but the organization was not successful financially, and passed out of existence in 1915. The several *minor leagues* of the United States and Canada are affiliated with the major leagues, and the two organizations have a working agreement whereby the "big" leagues are supplied with recruits from the minor. Such transfers of players are accompanied by payments in money; the sum of $50,000 has been paid for one infielder, and it is believed that more was once paid for an outfielder.

Baseball, as it is now conducted, is not only a clean, popular sport, but a highly-specialized business. The grounds and grand stands held by lease or owned outright by the major leagues represent a money value of from five million to ten million dollars, and it costs from $400,000 to $600,000 to purchase the franchise of an average club. The baseball "fans" of the United States and Canada constitute a goodly proportion of the population of those countries. The total receipts for the five games of the World Series of 1916, played by the Boston and Philadelphia clubs, were $385,590.50, and the total attendance 162,359. The last game of the series played in the magnificent new park of the Boston team was witnessed by 42,620, the largest number that ever paid to see one game, while hundreds of others enjoyed the contest from roofs of neighboring buildings. Probably not far from 10,000,000 people find time to see the national game during a single season.

The professional baseball player may not regard his occupation lightly. Men who win honors on the "diamond" are trained and disciplined. Temperance and clean habits are expected of all ball players, and late hours, overeating, drinking and other forms of dissipation are strictly forbidden. For several weeks before the opening of the season the men are put through a severe course in physical training, usually in the South, that they may enter upon the serious work of the year in first-class condition. During the season they travel in the most comfortable cars available and they live in the best hotels. The manager of a winning team, in other words, must see to it that his team is kept in fighting condition throughout the season.

The personnel of a club is constantly changing, for men are released as they lose their skill, new material is ever being sought, and desirable players are often purchased from one team by another. Ten thousand dollars is not considered an excessive price to pay for a good player. The number of men on the team

is also subject to change, but it is usually between twenty and twenty-five. In 1916 the National League fixed a limit of twenty-one players for each club. The baseball profession is a lucrative one. The ordinary utility man receives from $2,000 to $3,000 a year, while the annual salary of the "star" players, particularly pitchers, may be $10,000 and upward. One player, an outfielder, has been paid $18,500 for a season's work. The president of the American League receives $25,000 a year, and in 1910 he was given a twenty-year contract.

Details of the Game

The Diamond. By noting the accompanying diagram anyone can lay out a baseball field. The dotted lines should first be measured, at right angles to each other; the base lines should next be laid. All other lines are at right angles

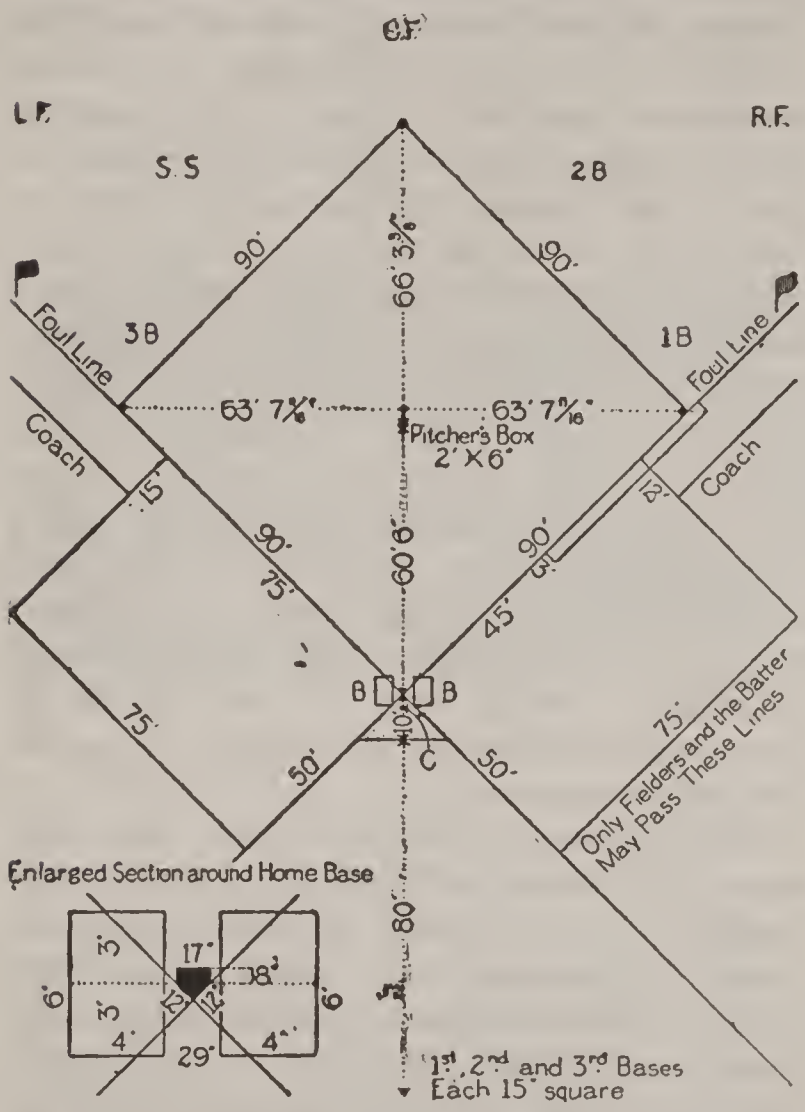


DIAGRAM OF REGULATION DIAMOND

either to a dotted line or a base line. The home base and the pitcher's plate are usually of whitened rubber, the other bases white canvas bags filled with soft material. Note particularly that second base has its center over the intersection of the base lines, while the others are within the diamond. The solid lines should be marked with lime, chalk or something equally noticeable. No fence on fair territory should be within 235 feet of the home base.

Boys often find more pleasure in playing on a diamond with less distance between the bases.

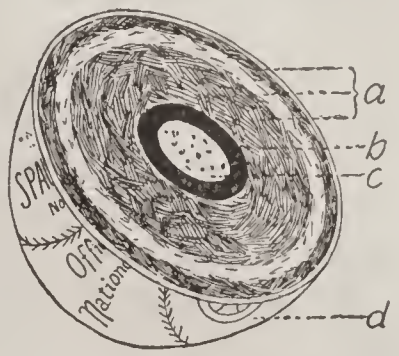
How the Game Is Played. A hardwood bat less than 42 inches long and 2¾ inches in diameter, a solid but elastic ball about 9 inches in circumference, a glove for each player, and masks and pads for the catchers form the usual equipment. Each team has nine players on the field during a game. While the members of one team take their turns *at bat* and attempt to score, their opponents are *in the field* to prevent them from scoring. The players in the field include the *battery,* the *infield* and the *outfield.* The battery consists of the pitcher (indicated in the diagram), who must have one foot on the *pitcher's plate* when throwing the ball towards the batter, and the catcher (*C*), who must wait for the pitched ball within the triangle behind the *home base.* The other players may be anywhere within the *foul lines,* but their usual positions are as indicated. The *infielders* are the first baseman (*1 B*), the second baseman (*2 B*), the third baseman (*3 B*), and the shortstop (*S. S.*); the *outfielders* are the right, center and left fielders (*R F., C. F., L. F.*).

The captain of the *home team* chooses whether his men shall bat or field first, and usually decides for the latter; therefore the visiting team is usually first at bat. The first batter of the visiting team then takes his position on one of the spaces marked *B.* When the pitcher throws the ball to the catcher the batter may let it pass or attempt to hit it. In the first case, the umpire, standing behind the catcher, calls "Strike" if the ball passes over any portion of the home base between the batsman's knees and shoulders, or "Ball," which means *unfairly delivered ball,* if it does not pass within that space. In the second case, if the batter attempts to hit the ball and fails, the umpire calls a *strike.* If the batter hits the ball and it does not go within the foul lines, or if it falls within the foul lines and rolls outside before passing first or third base, he is said to have made a *foul,* or foul hit. If the ball touches his bat without being turned from its course, he has made a *foul tip.* Unless the umpire has already called two strikes against the batter, a foul of either style counts as a strike.

To score a *run* the batter must pass around the diamond to first, second and third bases and again to the home base, which he must reach without being *put out*. If the umpire calls three strikes against him or if an opponent catches a foul before it touches the ground he is out without becoming a *baserunner*. An exception is made if there is no runner on first base and the batter's third strike is not caught. If the umpire calls four *balls*, the batter advances to first base, or he may do so if he is hit by a ball thrown by the pitcher.

If the batter hits the ball, unless he makes a foul as defined above, he starts to run around the bases. If an opponent catches the ball before it touches the ground, or while holding the ball touches first base before the runner reaches it, the runner is *out*. On his way to first base the runner must keep inside of the three-foot line shown on the diagram. If he reaches first base before the ball, but is running too fast to stop and does not wish to continue to second, he must turn to the right in returning to the base. If he continues on his circuit, or after he has stopped and returned to first base, he is out, if while not touching the base he is touched with the ball by an opponent. A batter who runs when his third strike is not caught must be put out in the same way as one who has hit the ball.

As soon as there is a runner on the bases the umpire usually moves to a position behind the pitcher. In important games there is usually a second umpire, who takes from the umpire-in-chief most of the responsibility of decisions regarding base-runners. The next batter endeavors to help the base-runner to advance. If he makes a *single*, a *safe hit* bringing him to first base, the runner ahead is often able to advance two bases. A *two-bagger*, or hit which enables the batter to reach second base, ordinarily gives the first runner a chance to score. A *three-bagger*, or a *home run*, in which the batter scores himself, of course scores everyone who was on the bases ahead of him. Sometimes the batter makes a *sacrifice* hit, one which gives the runner an opportunity to advance but does not enable the batter to reach first base. A common form of sacrifice is a *bunt*, in which the ball is hit so that it will roll slowly and not far from the home plate. If the runner advances without the help of the batter, he is said to have *stolen a base*. Should a ball hit by the batter be caught before falling to the ground and be brought to the base which was occupied by a runner before the latter can return to it, both the batter and the runner are out, and the fielders have made one form of *double play*. With more than one runner on the bases a *triple play* is sometimes made. One member of the team at bat may stand in each of the spaces marked *Coach*, to direct the batter and the runners.



HOW A BALL IS MADE

(*a*) Three layers of yarn; (*b*) rubber; (*c*) cork; (*d*) leather cover.

As soon as three men of the side at bat are declared out, the fielding and batting teams change places. When each has had a turn at bat, an *inning* has been played. Nine innings constitute a normal game; if at the end of them the score is a tie, the game continues until one side or the other is ahead at the end of an inning. The last half of the ninth inning is not played if the side which would be at bat is already ahead. By mutual agreement, or because of darkness or storm, five innings may be a full game.

Scoring. In nearly all games, both professional and amateur, a detailed record is made of the work of each player, called the *box score*. In the third game of a world's series, Boston's score was as follows:

Boston	AB.	R.	B.	P.	A.	E.
Hooper, rf	4	1	1	2	0	0
Scott, ss	3	0	0	2	1	0
Speaker, cf	3	1	2	2	0	0
Hoblitzel, 1b	3	0	0	9	0	1
Lewis, lf	4	0	3	1	0	0
Gardner, 3b	3	0	0	1	6	0
Barry, 2b	3	0	0	2	1	0
Carrigan, c	2	0	0	8	0	0
Leonard, p	3	0	0	0	2	0
Totals	28	2	6	27	10	1

0 0 0 1 0 0 0 0 1—2

Three-base hit—Speaker. Earned runs—2. Sacrifice hits—Scott. Sacrifice fly—Hoblitzel. Left on bases—4. First on balls—Carrigan, Speaker. Struck out—By Leonard, 6. Umpires—at plate, O'Loughlin; on bases, Klem; left field, Rigler; right field, Evans. Time—1.48. Attendance—42,300.

This is the interpretation of the box score printed above:

A. B., the number of times *At Bat*, not including those when the batter made a sacrifice hit or reached first base by a *base on balls*, being hit by the ball or interfered with by the catcher.

R., the number of *Runs*, or scores.

B., the number of *Base Hits*, or balls hit in such direction or with such speed that per-

Subjects for Baseball Essays

The Most Exciting Game I Ever Saw

(1) Preparing for the game
  (a) Why I went
  (b) With whom I went
  (c) How we reached the field
(2) Waiting for the game
  (a) The weather
  (b) The crowd
  (c) The general spirit
  (d) My own feelings of suspense
(3) The actual game
  (a) Relative strength of teams
  (b) Exciting incidents
  (c) The score
(4) After the game
  (a) How the victors felt
  (b) How the defeated felt
  (c) How I felt

What the Bat and the Ball Told Each Other

(1) The Bat speaks
  (a) Where I was bought
  (b) My owner
  (c) My appearance
  (d) My first game
  (e) How my first "strike" felt
  (f) "Swapped" for a catcher's glove
  (g) Broken and thrown in a corner
(2) The Ball replies
  (a) My pride in my original appearance
  (b) Given as a birthday gift
  (c) The delightful feeling of flying through the air
  (d) My anger when the bat struck me
  (e) Exciting games I played in
  (f) The first rip
  (g) Lost for a week
  (h) Cast aside for a rival
  (i) "Little brother's" plaything

fect fielding could not prevent the batter reaching base, or put out the runners ahead of him. It will be noticed that Lewis made the unusual record of three hits out of four opportunities, but scored no runs. However, this last hit made *in a pinch* with two men of his side already out, enabled Hooper to score from second base, winning the game.

P., the number of opponents *Put Out.* In this instance the first baseman has the greatest number to his credit, the catcher standing next. In a game where the pitcher *strikes out* many, the catcher would have more. If the opposing batters continually hit the ball into the air, the fielders have more.

A., the number of *Assists,* or times that a player assists in a *put out* by stopping, catching or throwing the ball.

E., the number of *Errors* which result in gains for opponents, not including those of the pitcher in pitching or of the catcher in failing to stop a pitched ball. By adding the number of put outs, assists, and errors we learn the total number of opportunities each player had and how reliable he is. Thus Hoblitzel's error does not show him a poorer fielder than Lewis, for Hoblitzel had ten chances, while Lewis had but one.

The figures below the total show in which innings the scores were made.

Earned Runs, those made without assistance by *errors* of the other side.

Sacrifice Hit, explained above in the text.

Sacrifice Fly, a ball hit into the air so far that, although it is caught before touching the ground, the fielder does not have time to return it in time to prevent a runner advancing.

Left on Bases. The number of men who reached bases and do not score shows in a general way the success or failure of team work at crucial moments.

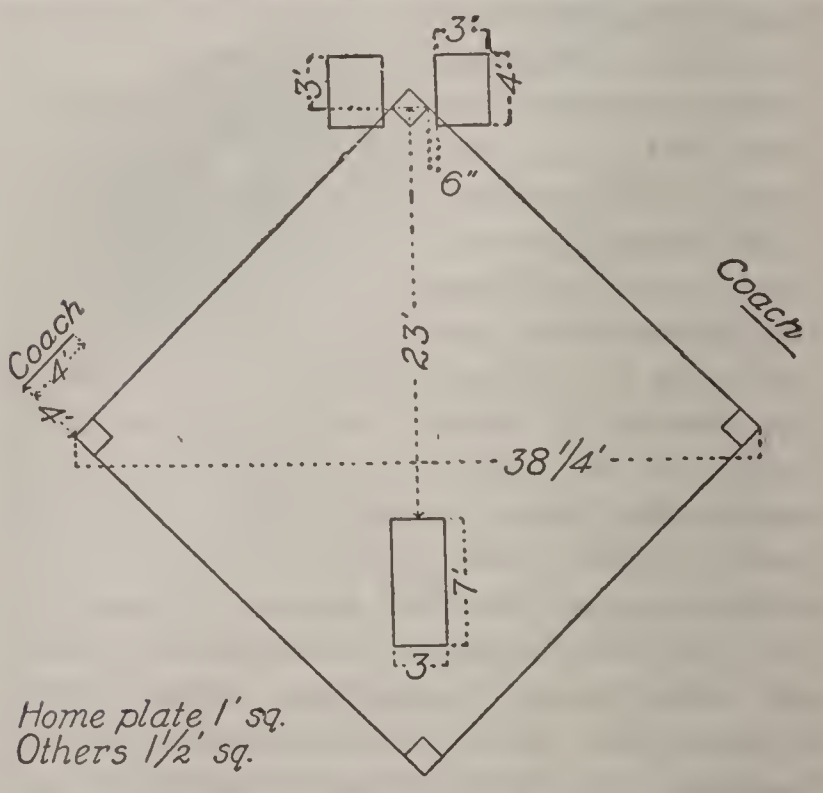
Base on Balls, shows something of the opposing pitcher's work, and more about the base running. Leonard, Boston's pitcher, gave no bases on balls.

Struck Out, the number of men put out by the pitcher's ability and judgment.

Umpires. This being a very important game, there were four.

Had there been any in this game, the summary would also have included *stolen bases, two-base hits, home runs, double* and *triple plays, wild pitches* and *passed balls* (pitches not stopped by the catcher).

Indoor Baseball. This is a popular wintertime game in gymnasiums. It is modeled after



FIELD FOR INDOOR BASEBALL

the outdoor game, with changes necessary to prevent damage to windows, and to adapt the

OUTLINE AND QUESTIONS ON BASEBALL

Outline

I. How the Game Is Played

(1) The field
  (a) Diamond shape
  (b) Dimensions
  (c) Bases
(2) Players
  (a) Number
  (b) Position
  (c) Duties
(3) Umpires
(4) The actual game
  (a) Batting
  (b) Base-running
  (c) Fielding
  (d) Innings
(5) Technical terms
(6) Scoring
  (a) Careful record of each player's work

II. The Science of Baseball

(1) What "professional" means in baseball
(2) Great physical control and accuracy needed
(3) Base-running—the most scientific feature

III. Organized Baseball

(1) Major leagues
  (a) National
  (b) American
(2) Minor leagues
  (a) In Canada
  (b) In United States
(3) Training and care of players
(4) Economic phases
  (a) Large receipts
  (b) Generous salaries

IV. Popularity

(1) National game in United States
(2) Popularity in other countries
(3) Part taken in its spread by soldiers

V. Indoor Baseball

(1) Difference in implements
(2) Difference in rules

Questions

How many members have the big league teams?

What is an earned run? What is a stolen base?

What difference is there between the home base and the second base in material and in position relative to the base lines?

In scoring, how do you know whether to credit the batter with a hit or give the fielder an error?

What position must the pitcher assume when pitching?

Which of the players usually make the greatest number of put-outs, and why?

What is the difference between a foul in indoor and in outdoor baseball?

What three items would you take into consideration in figuring what percentage of a fielder's plays were made without errors?

In what way can the batter make a strike besides failing to hit a fairly delivered ball?

How does pitching in indoor baseball differ from that in outdoor baseball?

What must the runner be careful to do when he reaches first base?

How many men are there on an indoor baseball team?

Where outside of the United States is baseball popular?

What is the average income of a ball player?

What are the requirements in a good player?

Can a good player safely use stimulants?

What is the highest price paid for a player?

What is the record attendance crowd at a single game?

How are championships played and determined?

playing to a small diamond. The ball is soft and larger than the outdoor ball. The bat is thinner. The bases are not fastened to the floor.

The main points in which the rules differ from those of outdoor baseball are the following: (1) Either seven or nine may constitute a team; (2) the pitcher must swing his arm parallel with the body, and must stand within his *box;* (3) a pitched ball striking the batter does not entitle him to a base; (4) a batted ball is fair or foul according to where it first hits, not where it afterwards rolls; (5) a base runner must be at his base when the pitcher delivers the ball and must not leave it till it has reached the catcher. W.C.

Consult Spalding's *Baseball Guide,* for complete rules; issued annually. For special instruction, consult Spalding's *Ameriea's National Game;* Chadwick's *Art of Pitching, Fielding and Base Running.*

BASEL, *bah' zel,* a most important commercial and manufacturing city of Switzerland, capital of the canton, or state, of Basel-Stadt. It is forty-three miles north of Berne, in two parts on opposite sides of the Rhine, connected by three bridges, the oldest of which dates from the thirteenth century. It has an ancient cathedral, founded in 1010, containing the tombs of eminent persons, the most notable being that of Erasmus; a university, founded in 1459; a seminary for missionaries, and a museum containing the valuable public library and pictures. The city possesses a most valuable collection of the works of the Holbeins, who for a time made their home in Basel (see HOLBEIN). The industries embrace the manufacture of silk ribbons, paper, aniline dyes, tanning and brewing. More than fifty per cent of the imports of Switzerland pass through Basel.

Here was signed the treaty of peace between France and Prussia and that between France and Spain, both in the year 1795, and in Basel was held an ecclesiastical council in 1431 (see BASEL, COUNCIL OF). Population in 1920, 135,976.

BASE LINE, in surveying, a line of known length and position, taken as the starting point for laying out townships and their subdivisions. For further description and illustration, see SURVEYING.

BASILICA, *ba sil' i ka,* among the ancient Romans a great oblong hall in which the magistrates heard pleas for justice and gave decisions. These courtrooms were common throughout the Roman world at the beginning of the Christian Era. The length of the typical basilica was about three times the width. At one end was the entrance; the other end, called the apse, which had the form of a half-circle, contained a raised floor or platform on which the judges had their seats. The roof was supported by two rows of pillars which ran from the apse to the front of the hall, and divided the main floor into three aisles—a central aisle, called the nave, and a narrower one on each side of it, called the portico.

There were numerous modifications of this type; the famous Basilica Julia, for instance, one of the most splendid buildings of ancient Rome, had five aisles and four rows of columns. The basilica furnished the model for the early Christian churches, and for a long time churches built on this plan were known as basilicas.

BASIN, *bay' s'n.* In the ordinary meaning of the term, a basin is the region drained by a river and all its branches, or the area drained by a river system. The Mississippi basin, for instance, includes all that part of North America drained into the Mississippi River and its tributaries. The term is also applied to regions in the interior of a continent, which have no outlet to the sea. In these regions salt lakes are occasionally found, such as Great Salt Lake in Utah, and the Dead Sea in Palestine. The streams in these basins flow into the lakes or disappear in the sands.

BASKET BALL, an American game played either out-of-doors or in gymnasiums, and popular with both sexes. It is an excellent game not only for physical exercise but for mental training as well, as it calls for concentration, quickness of perception and thought and the "team work" which is so valuable a feature of all group plays. Its rules governing fouls and behavior on the floor are so stringent that anger and loss of self-control practically rule one out of the game. Physically, the game does not demand the great strength of football; but quickness, agility, endurance, a keen sense of direction and muscular control are essential. Throughout it is a rapid game, well played only by enthusiastic players who throw themselves heart and soul into the sport.

Beginnings of Basket Ball. Unlike most games basket ball was not a slow growth, but was invented by a quick-witted young man. James Naismith had listened in the Young Men's Christian Association training school at Springfield, Mass., to a lecture on the elements of successful games, which proposed certain

OUTLINE AND QUESTIONS ON BASKET BALL

Outline

I. How the Game Is Played

(1) The field
  (a) Dimensions
  (b) Markings
  (c) The goal—a suspended basket net
(2) The ball
(3) The "make-up" of the team
  (a) Center
  (b) Forwards
  (c) Guards
(4) Length and object of the game
(5) The actual game
  (a) Specific duties of each player
  (b) Manner in which gains may be made
(6) Scoring
  (a) Baskets
  (b) Free throws
(7) Rules
  (a) For the regular game
  (b) For the "live" game
  (c) Fouls
    1. Technical
    2. Personal

II. Advantages of the Game

(1) May be played indoors or out
(2) Played by either sex
(3) Requires quickness but not great strength
(4) Tends to increase
  (a) Quickness of perception
  (b) Self-control
  (c) Speed
  (d) Endurance
  (e) Muscular control
  (f) Team-work faculty

III. Basket Ball for Girls

(1) Roughness eliminated
(2) Too violent for only form of exercise

IV. History

(1) Invention
(2) Rapid spread

Questions

Could a basket ball field be correctly laid out on a floor fifty by forty feet?

How many members of the team have the privilege of throwing for basket?

Why is drill behind closed doors necessary to the making of a good team?

How did it happen that basket ball was played at first only by Young Men's Christian Associations?

Which would a team rather do, make a basket from the field or score on a free throw?

What is the difference between a technical foul and a personal foul?

What difference is there in the penalty dealt out for them?

What advantage has basket ball over football for the average player?

Describe the difference between a *regular* game and a *live* game.

How far may a player run with the ball?

Why would it not be wise for a girl who clerks in a store to spend two evenings a week playing basket ball?

How does the ball differ from that used in football? What are the goals?

If two players get the ball simultaneously, how is it put into play again?

What happens when a ball goes out of bounds?

Who invented basket ball?

What beneficial effects besides physical strengthening does the game have?

If a game begins at eight o'clock, at what time will it close?

Is actual play going on all the time?

Which form of basket ball is commonly played by girls? What is its advantage?

Which player has a chance to play first?

inventive tests. He worked out this game practically as it stands to-day in all essential features. Other associations throughout the country promptly took it up, and were later followed by schools and colleges, until now it is one of the most popular of athletic sports.

How Played. The game is played on a field laid out as shown in the accompanying diagram. This field must be longer than broad, and should cover not more than 4,500 nor less than 2,100 square feet of actual playing space,

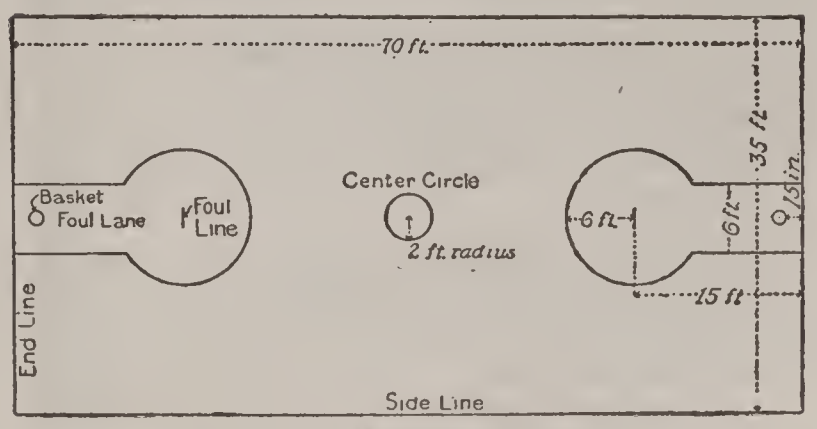


DIAGRAM OF COURT

though a boundary territory on all sides is necessary; 70 x 50 feet is ideal, but the usual dimensions are 70 x 35 feet. At each end of the field, in the center, is a *goal,* which consists of the *basket,* suspended ten feet above the ground. This basket is a hammock net on a metal ring eighteen inches in diameter, which must be from six to fifteen inches from the rigid surface to which it is fastened. The ball, resembling a football, but round instead of oval, is an inflated rubber bladder in a heavy leather case. It is from thirty to thirty-two inches in circumference, and weighs from twenty to twenty-three ounces.

The rules of play are in two forms, one for a regular game, and the other for a so-called live game, both of which are played by both sexes, though the live game originated as women's rules. In the live game the court is divided by extra transverse lines into zones, to one of which each player is confined. This eliminates many of the rougher or more active features. The directions here given apply practically to either game. A team consists of five persons—a center, left and right forwards, left and right guards; and each player should have qualifications for his particular position, though the specialization is not so decided as in football or baseball, and frequently in the regular game a skilled player will "play all over the floor." The game is played in two halves, usually of twenty minutes each with ten minutes between, and its object is the "making of baskets" by either team.

Scoring. Each team has a basket for which it throws, trying at the same time to prevent the opposing team from making baskets. A "basket" counts two points if thrown in active play, but a "basket on fouls" counts but one point. Whenever a foul is called by an official against any member of a team, the opposing team has a "free throw"; that it, a chosen player stands at the free throw line, fifteen feet from the basket, and tosses the ball toward the basket, no interference being permitted.

Course of the Game. The centers of the two teams take their positions in the four-foot circle in the middle of the field, each facing his own goal, (the goal into which he will try to throw the ball) and the referee tosses the ball in the air between them, higher than they can jump. With this throwing of the ball, play begins. Each center tries to strike the ball as it comes down, and the players of both teams follow the ball about the field, attempting to seize it and throw it towards the goal. Though the forwards are the players whose specific duty it is to throw for basket, the center and the guards have the same privilege in the regular game. The special business of the guards, as the name implies, is to guard the basket, or rather to oppose the forwards of the other team, who are to be prevented from throwing for baskets. When the ball goes beyond the boundary line, it is put in play again by an opponent of the player who forced it out of bounds, or if the referee cannot determine which player touched the ball last before it went out of bounds, he puts it in play by tossing it up between the two opposing players who are nearest it.

A player may catch the ball, throw it or strike it with the open hand, but he may not run with it, kick it, or strike it with the fist or body, and when he holds it, it must be entirely with the hands. Nor may he touch the body of any other person carrying the ball, or lay hands upon the ball when it is in another's possession. If two players grasp the ball at the same time, the referee tosses it up between them as he does between the centers at the opening of the game.

The rules against foul plays, which include *technical fouls,* such as running with the ball, kicking the ball or striking it with the fists, as well as such personal fouls as holding an opponent, pushing, tripping or using unnecessary roughness, are very strict. As stated above, any foul gives to the opposing team a

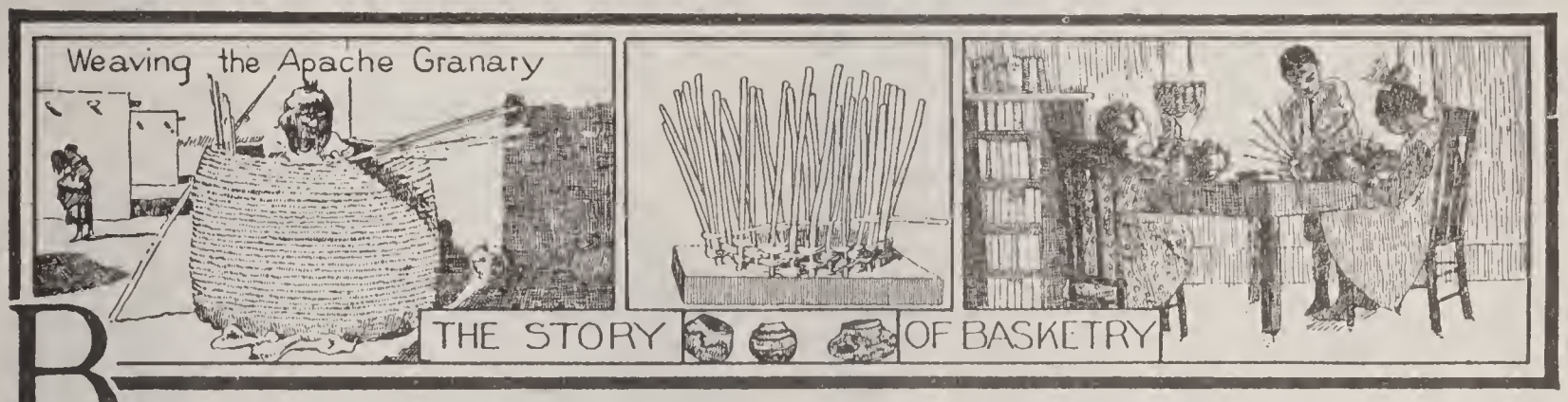
free throw, but only personal fouls disqualify a player. Any one who makes four personal fouls is disqualified for the remainder of the game.

Basket ball gives excellent chance for team work, and every well-drilled team has signals which are intelligible for certain formations and plays to its own team but mean nothing to the opponents. By these the general course of the play may be determined, but of course they must be very flexible, permitting of instant adjustment, for seldom indeed does a game proceed as it has been mapped out.

Basket Ball for Girls. The elimination of roughness and "all over the floor" play makes basket ball an excellent game for girls, and many play the regular game; but it must be remembered that if rightly played it is never an easy, leisurely game, suited to those who wish merely a little light exercise. Indeed, unless undertaken under the direction of a competent leader, the game is likely to prove too violent for anyone not in excellent condition. A girl who works, for instance, will not find a game or two of basket ball a week the best exercise for her unless she takes other exercise to keep herself in fit condition.

Any intending player of basket ball, man, woman, boy or girl, should be examined for heart condition by a regular physician before engaging in play. J.H.B.

Consult Spalding's *Guide to Basket Ball,* for playing rules. For general information, applying particularly to the game for girls, consult Hill's *Athletic and Outdoor Sports for Women.*



BASKETRY. "O let me do it," is the plea that every mother and teacher hears from day to day as the child, eager for something to occupy his hands and mind, discovers some simple work at which he thinks he can succeed. The thoughtful parent and teacher are constantly in search of occupations suitable for children, and one of the most available is that of making baskets.

Basketry is one of the most desirable occupations for children in the school and in the home for the following reasons:

1. It is simple, and can be made successful without any large amount of previous training on part of the teacher or mother.

2. It is inexpensive. It requires only a few simple tools, and the material is at hand with only the expense of labor necessary to gather and prepare it. This makes basketry especially suitable for rural schools.

3. It is one of the best occupations for training the hand and eye.

4. The baskets are useful and in making them the child feels that he is contributing to the welfare of the home as well as gratifying his desire to make something.

Material. There is a great variety of material suitable for making baskets. For convenience we divide it into imported and native. The imported material consists of rattan, raffia, palm leaf, rushes and hemp. The native includes willow, cat-tail, flags, rushes, straw, grasses, corn husks, willow bark, cedar bark, and for large baskets, splints of ash and other woods. The above list does not include all the materials available for baskets, for in each locality will be found something that may not be found elsewhere.

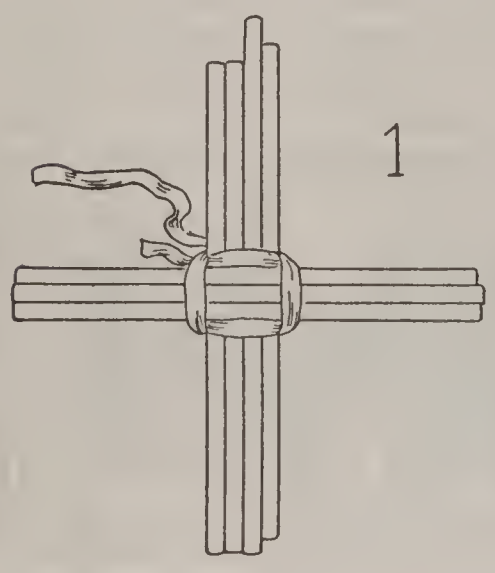
Preparation of Material. Since imported material is placed upon the market ready for use, our attention to preparation is confined to native material. The willow should be cut when the twigs are small, and the bark should be peeled off before the twigs dry. If care is used in peeling the bark it can be used for weaving. Flag leaves should be split into strands before they dry. All material should be dried as soon as collected; the color is better preserved if the drying is in the open air where the material is exposed to the sun.

Tools. The only tools necessary are a sharp knife, a pair of strong shears, a brad-awl or a large knitting needle, and a tape measure.

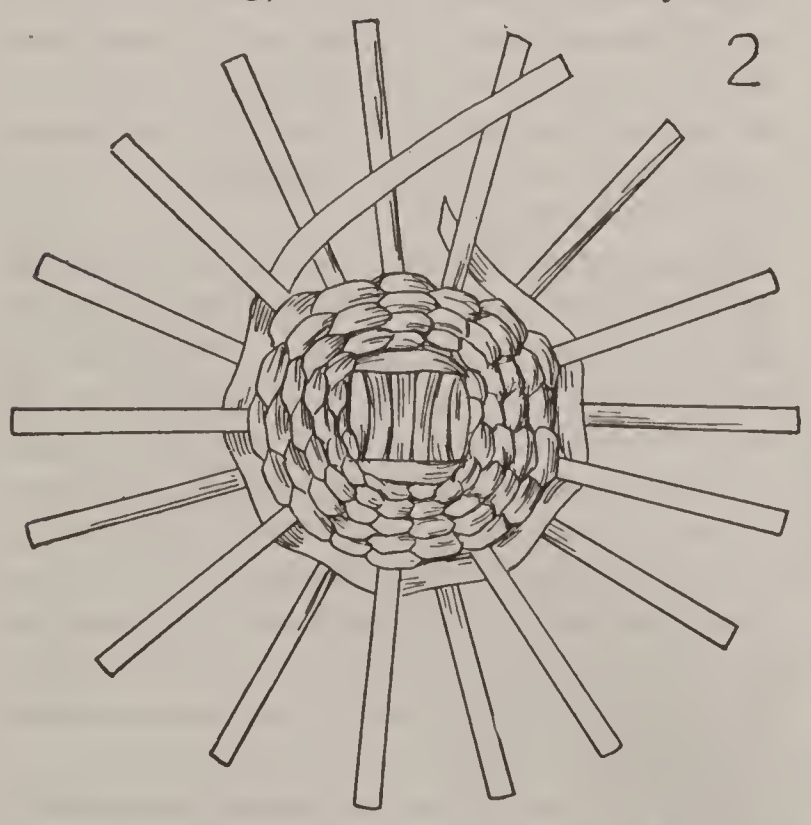
Mats. The first step in making baskets should be the making of one or more mats. The mat is easier to make than the basket, and it is also the foundation of the basket, because in making the basket we must begin

with the bottom. Two sizes of material are necessary, the larger size forming the frame and known as *spokes,* and the smaller for binding the frame together and known as the *weaves.* If the material is dry and brittle it should be soaked until it is pliable. Do not soak too long or it will absorb so much water that it will swell; then it will shrink on drying, and the mat will be loose.

Take six pieces of rattan or small willow, as the case may be, 12 inches long and one piece 7 inches long. Arrange them in two bunches of three each; cross them at right angles at the center. Hold them in the right hand, so that three will be horizontal and three vertical. Insert the seven-inch piece between the first and second vertical spokes above. Bind them together with the weaves, rattan or bark, as shown in Fig. 1. Weave over and under the center from left to right and pull the weaves down close to the center.

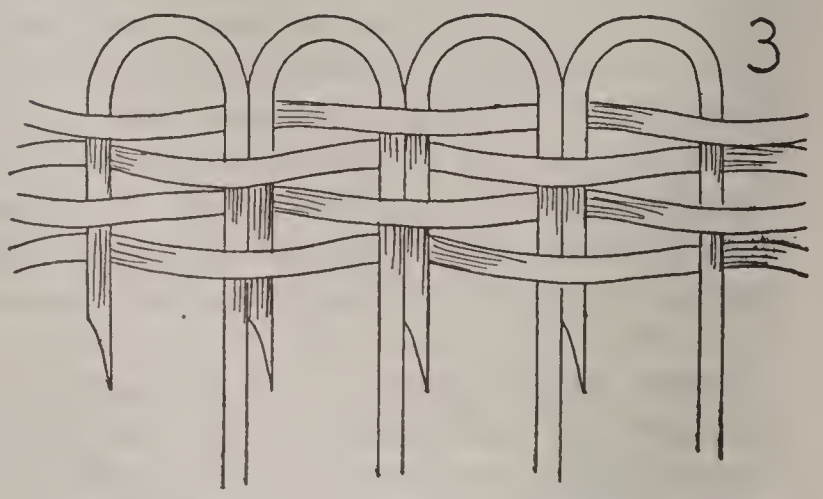

1

Begin to separate the spokes with the second row of weaving; with the third row they should

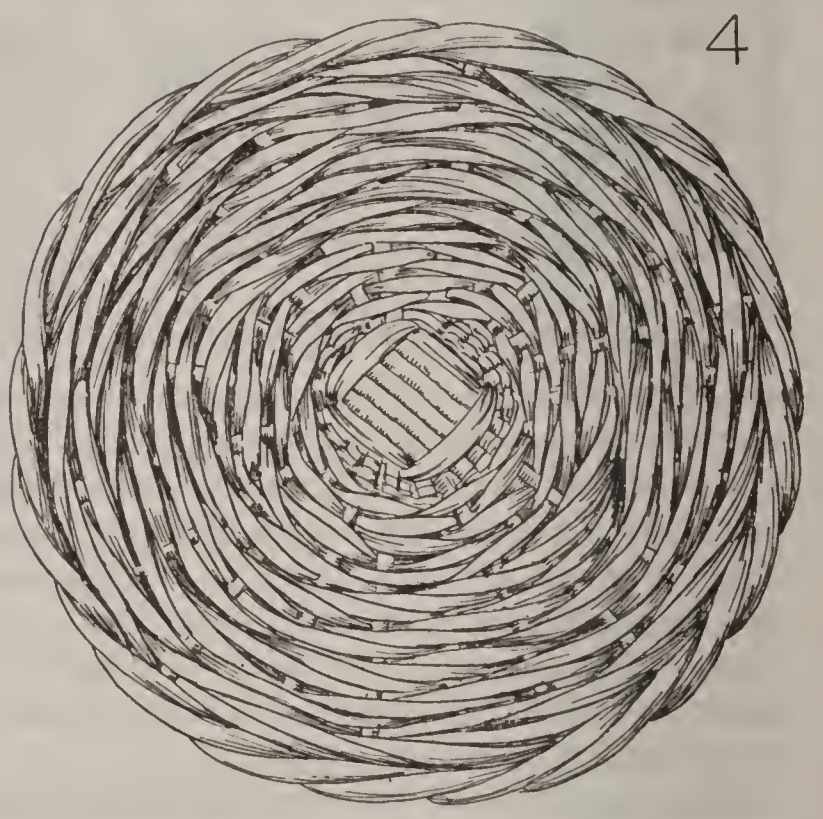

2

be evenly separated, as in Fig. 2. When the mat is six inches in diameter, fasten the weaves securely and make the border. The spokes should extend three inches beyond the mat. Cut the ends, if necessary, to make them even. Sharpen the ends so they will push down between the weaves, then bend them as in Fig. 3.

Fig. 4 shows the completed mat. Practice on mats until your weaving is even and the mat is perfectly flat. Then you are ready to begin a basket.


3

Simple Basket. Let the basket be three inches across the bottom and five inches deep. This will require eight spokes 21 inches long and one 11 inches long. Make the bottom of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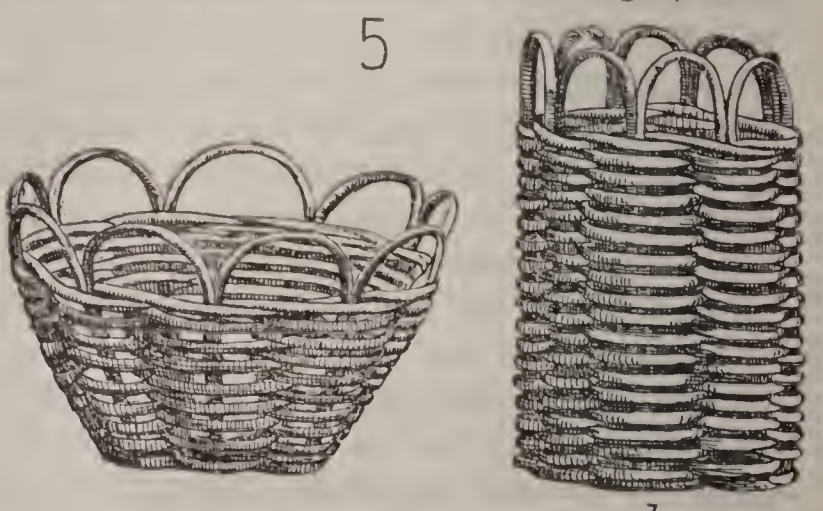
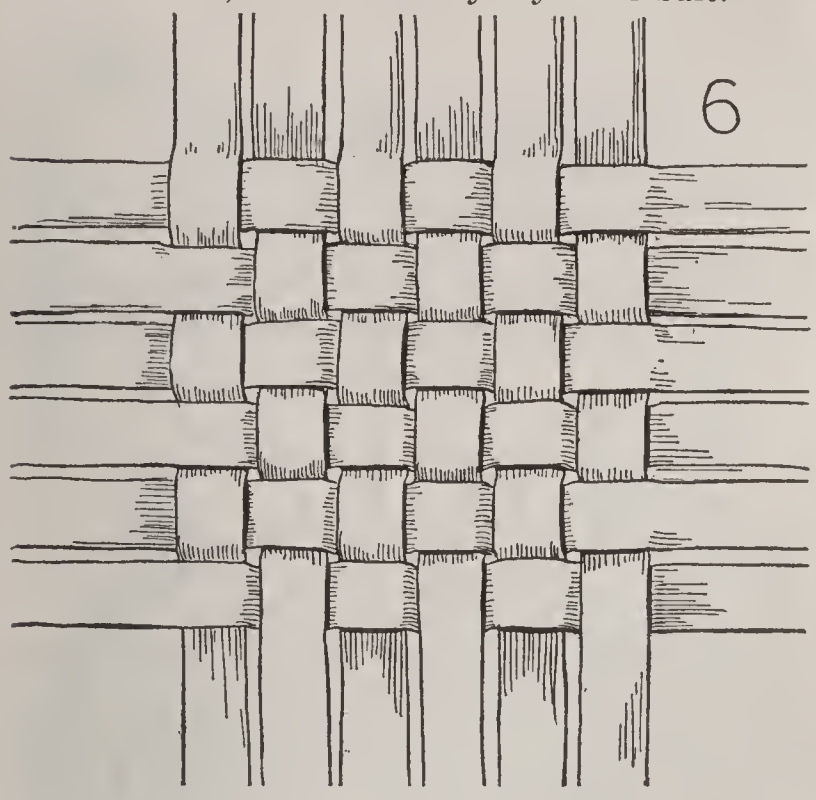
the basket just as the mat was made. Bend the spokes to an upright position and fasten them by the first and second weave. If you wish a vertical basket, make the weave tight, but if


5

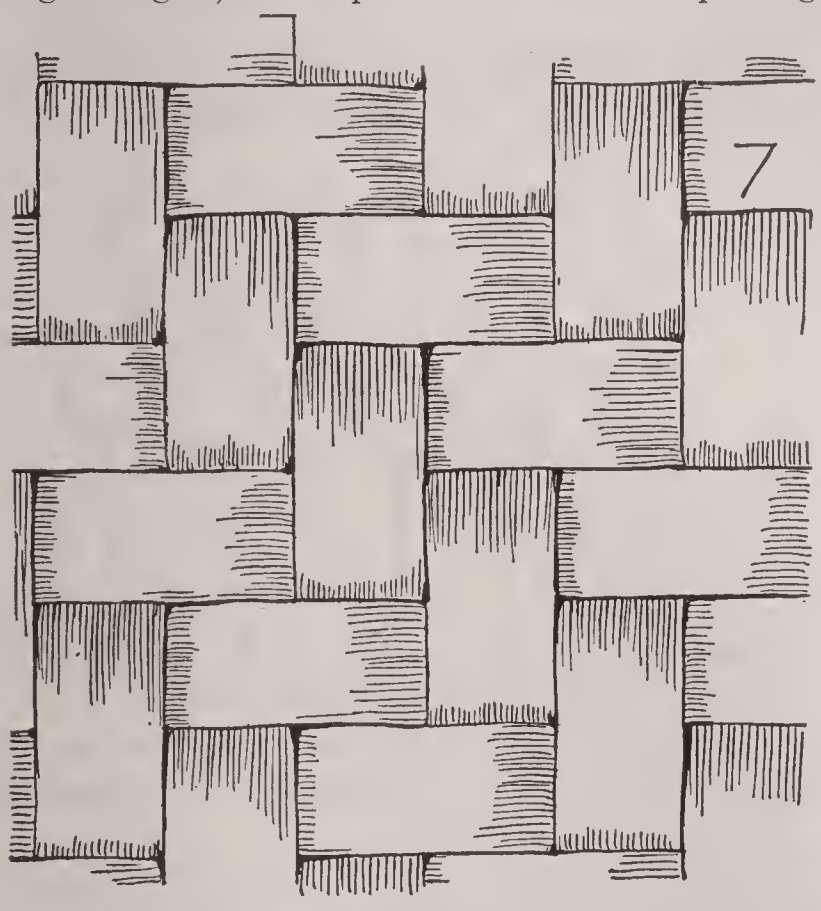
a *b*

you wish to have it larger at the top, let the weave be somewhat loose. When the right height is reached make the border. Fig. 5

shows the completed basket, which will be in the form of *a* or *b*, depending on the tightness or looseness of the weave. When you have acquired skill in making a simple-weave basket you will be able to weave with two or even three weaves, and to modify styles to suit.



Splint Baskets. Splint baskets are in common use wherever strength and durability of structure are desired. The most suitable material is black ash, which is easily split into long thin strips that become very pliable when soaked. The simplest weave for a splint basket is shown in Fig. 6, in which the splints cross at right angles, each splint of the "weft" passing



alternately over and under the splints of the "warp." This style of weave is not suitable for the bottom of a round basket, but it may be used with equal success with both coarse and fine splints.

Outline and Questions on Basketry

I. Advantages

(1) Simple
(2) Inexpensive
(3) Good training
(4) A useful art

II. Materials

(1) Imported
  (a) Rattan
  (b) Raffia
  (c) Palm leaf
  (d) Rushes
  (e) Hemp
(2) Native
  (a) Willow
  (b) Cat-tail and rushes
  (c) Straw and grasses
  (d) Corn husks
  (e) Bark
  (f) Splints
(3) Preparation
(4) Tools

III. Weaving

(1) Mats
(2) Baskets
  (a) Simple weave
  (b) Splint baskets
  (c) Twilled work
  (d) Wicker
  (e) Twined baskets
  (f) Coiled baskets

Questions

What materials growing near your own home are suitable for basketry?

Why would it not be wise to soak the materials for basket-making over night?

In making a simple basket, how can you determine whether the sides shall slant or be vertical?

Which is the most intricate of all the styles of weaving?

Give four reasons why basketry should be popular.

What tools are necessary?

In finishing a mat, what is done with the ends of the spokes?

What is the difference between twilled work and wicker work?

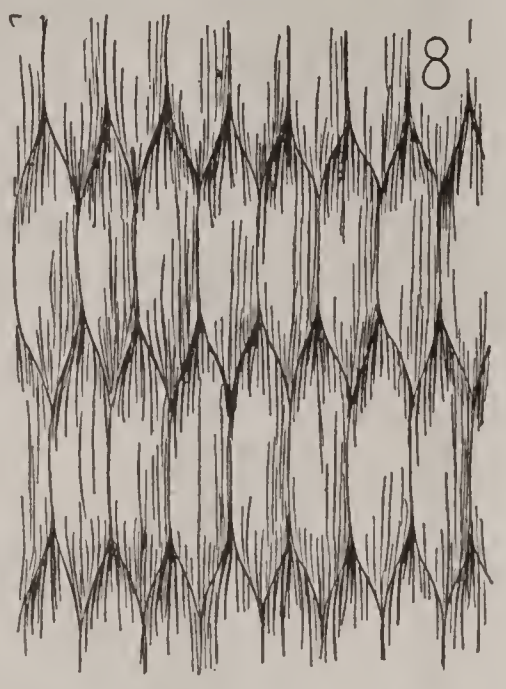
Is morning or evening the better time for gathering materials?

Is weaving done from right to left or from left to right?

What implements and what materials are used in making coiled baskets?

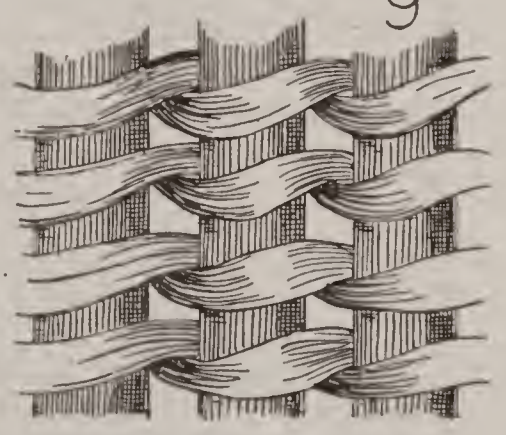
What tree furnishes the best material for splint baskets?

Twilled Work. A style of weaving known as *twill work* is common in baskets made from cane. It consists in passing each splint of the weft over two splints of the warp, then under two, thus forming a diagonal or twilled pattern. See Fig. 7.


8

Wicker Work. Wicker work, Fig. 8, is commonly seen in willow baskets. It is subject to a great variety of changes, sometimes being combined with twilled work in forming borders.

Twined Baskets. Twined baskets are common among the Indians of the Rocky Mountain and Pacific coast regions. Twining is the most intricate and beautiful of all styles of weaving, and many baskets so made are marvels of skill and art. The warp is of strong rods or splints which are not easily bent; the weft is in pairs or in three-strand twining, and braiding in threes. Twining is subject to many changes of pattern, hence a great variety of styles comes from it. Fig. 9 shows the method of starting a basket in three-strand braid and twined work. This work, however, is too difficult for beginners.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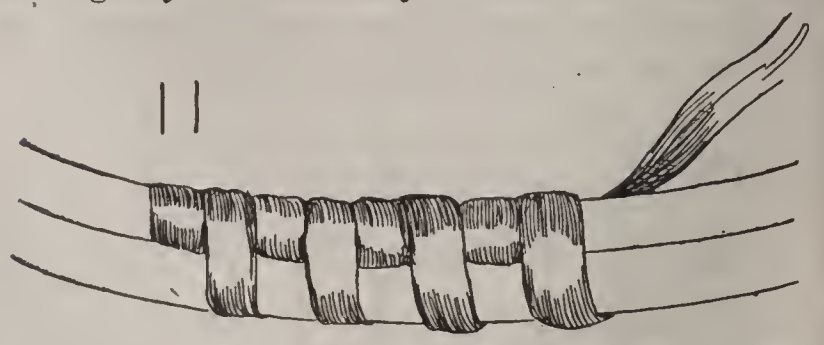
Coiled Baskets. Coiled baskets are easily made, and this method of construction is usually chosen for small baskets. Raffia, rushes, grass, cat-tail, flag and other flexible material may be used. Coiled baskets are made by sewing over and over with a flexible material, each stitch interlacing with the one underneath. What corresponds to the warp in the woven basket is of coarser and more rigid material than that used for sewing. A needle with a large eye is necessary. Various stitches are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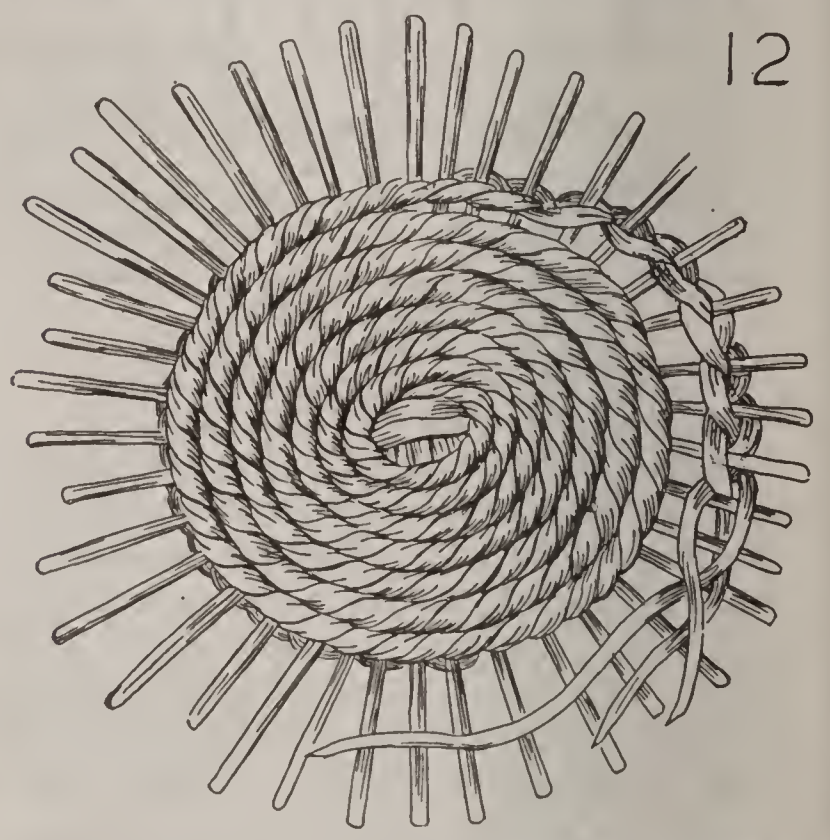
used, each forming a different pattern, shown in Fig. 10, *a*, *b* and *c* and the long and short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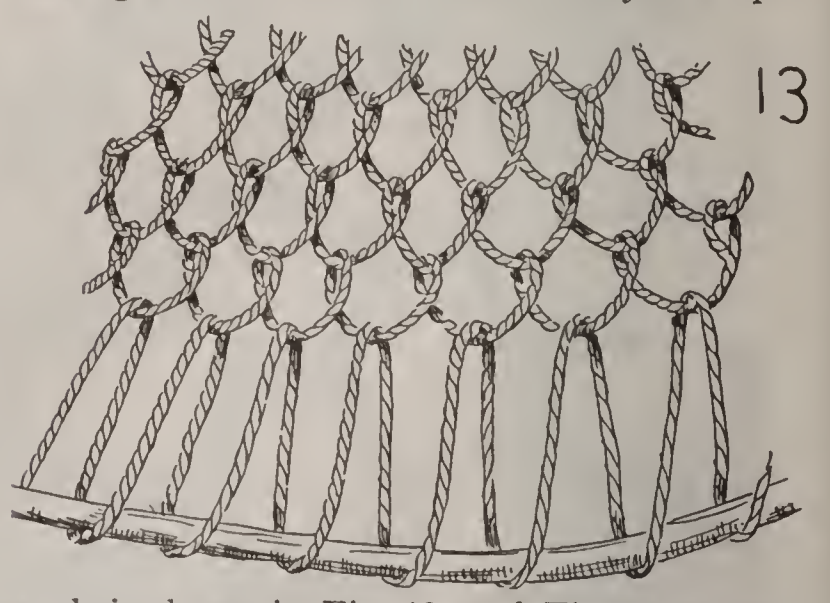
stitch, in Fig. 11. Fig. 12 shows the process of making a coiled mat. A beautiful style of open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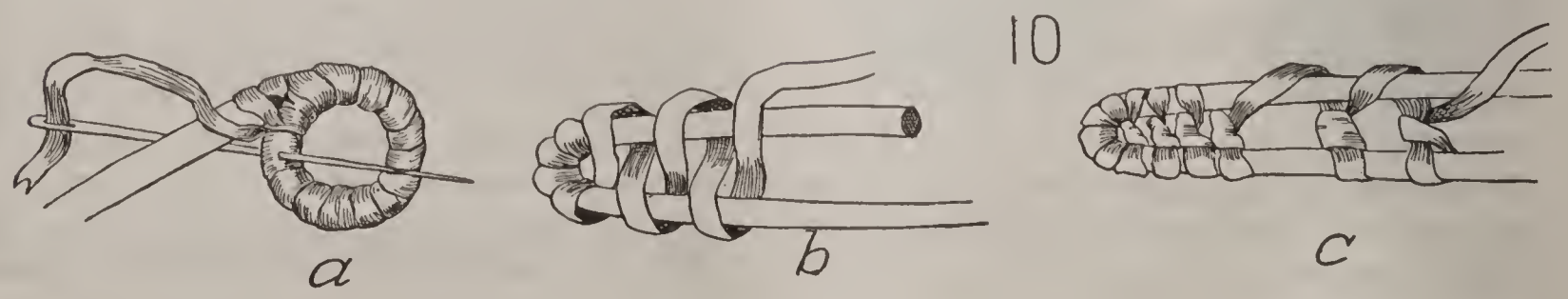
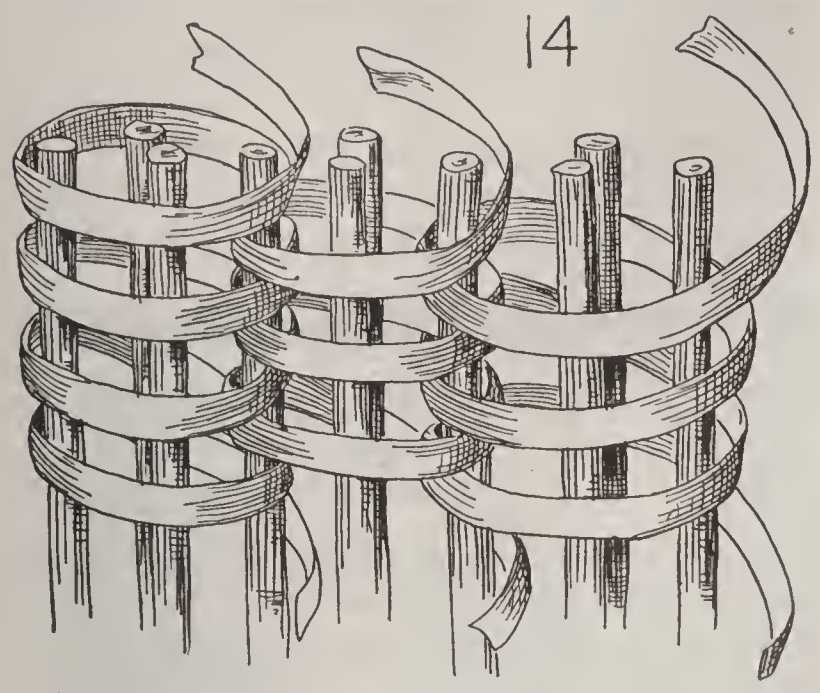
work is shown in Fig. 13, and Fig. 14 shows a pattern in which the stitches are coiled around


10

a *b* *c*

three rods. Coiled basketry is admirably adapted to school and home work, and it lends itself readily to the use of such home material as grass, cat-tail and corn husks.



Among the Indians coiled baskets have been found so small that they would pass through a lady's finger ring, while others are larger than an ordinary barrel. W.F.R.

Consult Mary White's *How to Make Baskets;* Laura Rollins Tinsley's *Practical and Artistic Basketry;* William S. Martin's *Inexpensive Basketry.*

BAS-RELIEF, *bah' re leef',* which means literally *low relief,* is a mode of sculpturing wherein the figures stand out but slightly from their background. Strictly speaking, the projection should be less than half the thickness of the figure, but if the work is artistic it may appear to the observer to project considerably more. A part of the frieze of the Parthenon at Athens, the work of Praxiteles, which contains the most famous examples of bas-reliefs in the

ON THE PENSION BUILDING, WASHINGTON

Figures like these, representing an army on the march, extend the entire distance around the great building.

world, is here pictured. These figures give in every line the sense of movement. The horsemen in the procession seem actually to progress, for the first horse has his leg raised but slightly, the second raises his higher, the third still higher, somewhat in the manner in which the very earliest moving pictures were made. See Alto-Rilievo; Mezzo-Rilievo.

SECTION OF FRIEZE OF THE PARTHENON

BASQUE, *bask,* a brave, proud and independent people whom no invaders have ever crushed or expelled from their native province in Northern Spain and the southwestern corner of France near the Pyrennes. They have refused to mingle much with inhabitants of the neighboring provinces, but have kept unchanged their ancient customs, dress, and, above all, their language. This language, which so far as is known bears no relation to any other, is spoken by perhaps half a million people. Though industrious and home-loving, the Basques make excellent sailors or soldiers when the necessity arises. Ignatius Loyola, Saint Francis Xavier and other famous men were natives of the Basque provinces.

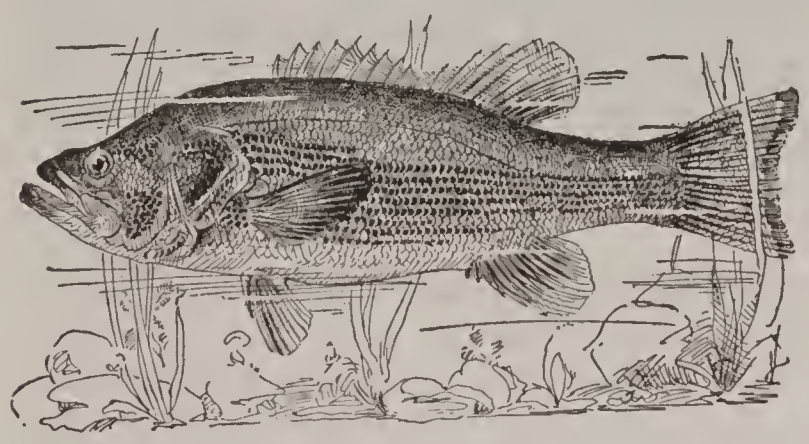
The fitted, skirtless jacket formerly worn by women everywhere is called a *basque,* because it was copied from the garb of the Basque women.

BASS, the name given to many species of fish which differ in size, shape, color and markings, but which in general possess one common trait—they are all fighters, or game fish. They may be divided into two great groups, fresh-water and salt-water bass; it is the former with which the fisherman is most familiar.

Fresh-Water Bass, which belong to the sunfish family, are chiefly of two species—the large-mouthed black bass and the small-mouthed black bass; and of these it may be said that, considering their size, they are among the gamest fishes that swim. Both species have short, compressed bodies, and are beautifully colored. The large-mouthed bass loves the quiet water of a lake, where it lurks near shore in the

shelter of rocks or snags, but the small-mouthed species prefers the clear, running water of a stream. The former often attains a weight of from six to eight pounds, and sometimes even of twelve or fifteen pounds, but the latter does not grow so large. Both are excellent food fishes, their flesh being white, flaky and very firm if taken from cold water.

The black bass is caught best by casting, as it swims not far from the surface of the water and spies the bait the instant it strikes the water. A light rod with tackle somewhat heavier than that used for trout-fishing is the regular outfit. Bass will rise for minnows, frogs or angleworms, but most frequently arti-



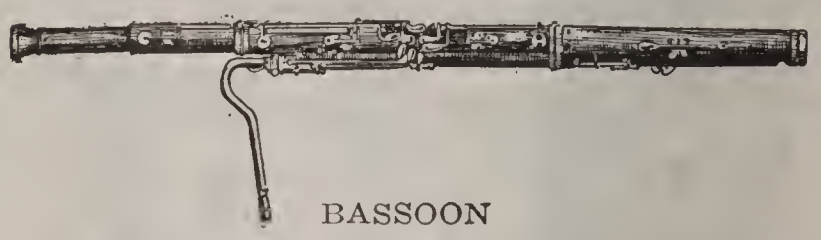
BLACK BASS

ficial flies of brown or black with a plentiful mixture of red are chosen. The average trout cannot tire out a fisherman as can a large game fish; most amateurs will find a struggle with five-pound bass a sufficiently sharp contest.

The Salt-Water Bass are not closely related to those above described, but they, too, afford excellent sport. The best-known species is the striped bass, or rock fish, of the Atlantic coast, one of the chief food fishes of North America. Angling for these great fish, which often weigh from forty to eighty pounds, is one of the chief sports of the eastern coast. With these, as with their inland relatives, casting is the most effective method, but the rod and tackle must be correspondingly stronger, and living bait seems most attractive. In all seas surrounding America bass are plentiful; the sea bass off the coast of Southern California sometimes weigh between 300 and 400 pounds. G.W.

BASSANO, *bahs sahn' no,* ALTA., a town eighty-two miles east of Calgary and ninety-seven miles northwest of Medicine Hat, on the main line and two branches of the Canadian Pacific Railway. Three miles from Bassano is the great Horseshoe Bend dam, which cost $7,000,000, and was built to impound water for the Canadian Pacific's irrigation project. The dam consists of an earth embankment 7,000 feet long and about forty-five feet high, to which is joined a concrete spillway 720 feet long. Bassano is the natural center for the surrounding agricultural area, and will probably become the most important point between Calgary and Medicine Hat. Population in 1911, 540; in 1921 it was 799. See CANADA, subtitle *Irrigation.*

BASSOON', a musical wind instrument of the double reed variety, played by blowing through an S-shaped mouthpiece. Like a flute,



BASSOON

its notes are produced by holes, some of which are stopped by keys, others by the fingers. It serves as the bass among wind instruments, and has a compass of three octaves. For convenience of carriage the instrument is divided into three or more parts, whence it derives its Italian name *fagotto,* meaning a *bundle.*

BASS, *base,* **VIOL,** a musical instrument played with a bow, constructed like the violin, though much larger (see VIOLIN). It is so large, in fact, that to be played the bottom must rest on the floor and the body held between the knees. Viols are really the ancestors of the violin, at one time there having been the treble, tenor and bass viols. Bass viols are occasionally used as solo instruments, to play lute compositions, but they are more generally used to play the bass in orchestras. Two are used in the larger symphony orchestras.

BASS VIOL

BASSWOOD, BASS or **LINDEN,** a large, handsome tree found east of Montana throughout the United States and Canada, in Europe and Northern Asia. In dense forests it grows straight, but in open places is a spreading tree, giving plenty of shade and shelter with its large, oval, tooth-edged leaves. The yellow flower-clusters, fragrant and rich in honey, furnish an oil used in perfumes. The American

LEAF AND FLOWER OF BASSWOOD

basswood grows to a height of eighty feet or more, with a diameter of four feet. It lives hundreds of years, and it takes centuries for it to reach its full height.

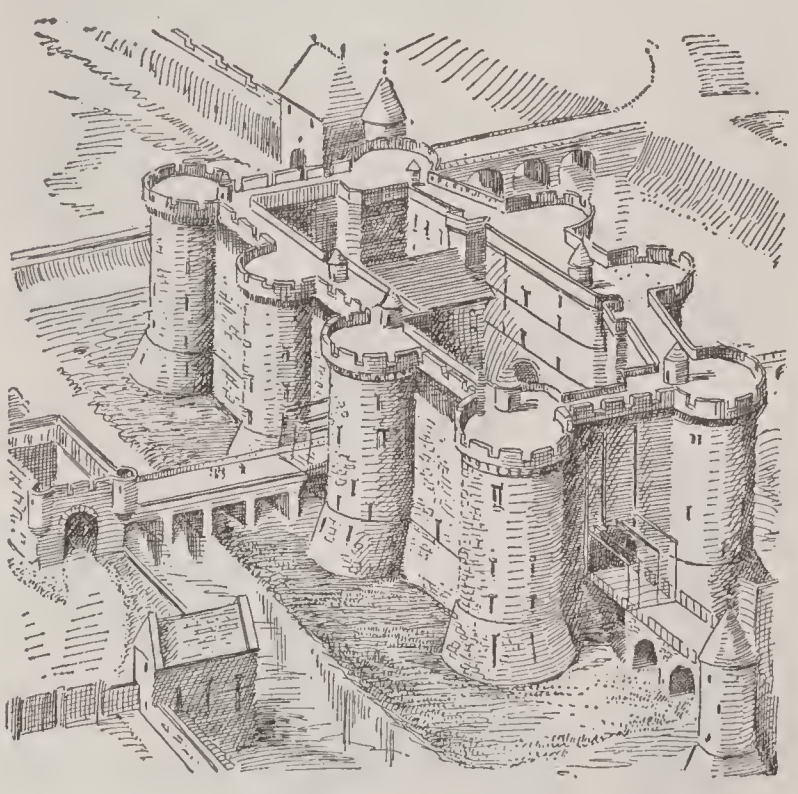
These trees bear a berry-like, gray-green fruit the size of a pea, the seeds of which have a sail-like leaflet. When the pods are ripe and burst open, the little seeds sail away on the breezes. The timber of the linden is called *whitewood,* and is used for carriages, furniture, boats, honey-boxes—and the tones from the piano come from basswood sounding boards. The inner bark is used for mats, fish net, cord and coarse cloth. High grade charcoal is also obtained from basswood.

In Berlin, Germany, there is a wide street nearly a mile long, lined with linden and chestnut trees, bearing the name "Unter den Linden." It is described in the article BERLIN.

BASTIEN-LEPAGE, *bas tyaN' le pazh',* JULES (1848-1884), a French portrait and landscape painter, whose work had a simplicity and naturalness that has brought him repute as the leader of a new school of art. He studied at Verdun and at the School of Fine Arts in Paris, and first won attention in 1874 by his *Song of Spring,* the picture of a peasant girl looking down upon a village. The same year he exhibited his *Portrait of My Grandfather,* showing the subject in the act of taking a pinch of snuff; this canvas was so unconventional as to be considered a new departure in portrait painting. Bastien-Lepage won the Cross of the Legion of Honor through his *Portrait of Madame Bernhardt,* but failed in his efforts to obtain the coveted "Prize of Rome." His most important landscape painting, *The Hayfield,* now in the Luxembourg Gallery, is regarded as a fine example of realistic art.

BASTILLE, *bas teel',* the famous Parisian prison whose destruction on July 14, 1789, is celebrated as a national holiday of France. In the French language *bastille* means any strongly-fortified structure. The Bastille of Paris, built by Charles V about the year 1370 as a citadel, became a place of confinement for those who had displeased the king or his court, and to the people it became a hated symbol of oppression.

The storming of the Bastille by the Parisian mob as the protest of the common people against the centuries-long oppression of the ruling classes was the first act in the French Revolution (which see). After the mob's demands had been refused by the governor, Delaunay, its members assaulted the fortress. After hours of fighting they had only effected an entrance into the outer court, but the arrival of a few pieces of artillery of the Royal

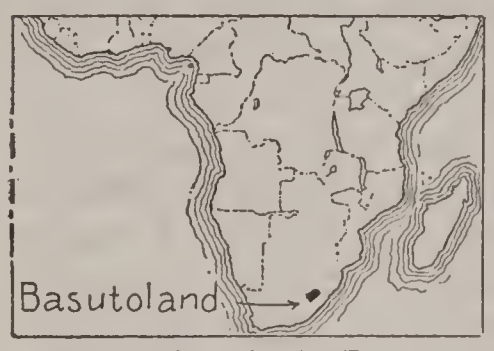


THE BASTILLE

Guard forced Delaunay to lower the second drawbridge. The governor was seized, and on the way to the town hall was put to death.

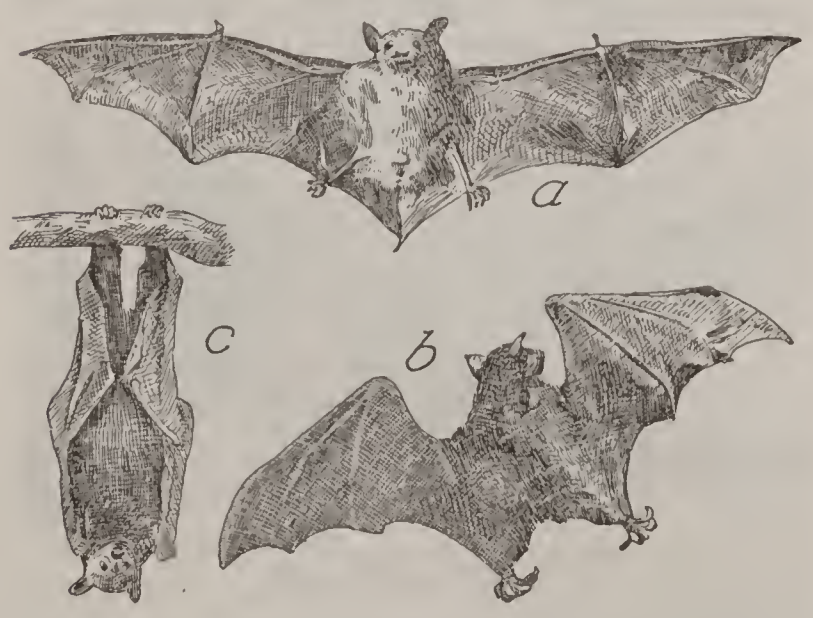
On the following day the razing of the Bastille commenced. The key was sent as a present to George Washington in America. To-day a bronze column marks the spot where the first struggle for French liberty took place.

BASUTOLAND, *ba soo' toh land,* the finest grain-producing and cattle-raising country of the African continent, noted especially for its breed of ponies, which equals that of the Arabian horses of the desert for speed and endurance. Basutoland is a native province and British possession of South Africa, bounded on the northwest by Orange River Colony; on the south and southeast by Cape Colony and on the northeast by Natal. The region is mountainous, with well-watered valleys and fertile slopes, and it has several peaks which rise to a height of 10,000 feet. In 1871 the Basutos, who had lived under a semi-protectorate of the British since 1848, were proclaimed British subjects and the province was joined to Cape Colony. In 1879 the native tribes caused a revolt which the Cape forces were unable to put down, and, finally, in 1884, when peace was restored, Basutoland was separated from Cape Colony and is now governed by a resident commissioner under the high commissioner of South Africa. The Basutos are of Bantu stock, hardy, intelligent and quick to adopt modern ideas (see BANTU). Area, 11,716 sq. mi.; population, 1921, 500,544.



BASUTOLAND

BAT, a little creature of the night, one of the group of wing-handed, flying, back-boned mammals. Its best-known characteristic is that it cannot see well in the bright light of day, from which fact comes the expression, "Blind as a bat." At night, however, its sight is keen, and it is therefore a nocturnal animal, or night-flier. Bats are common in temperate and warm regions, but most numerous and of largest size in the tropics.



THE BAT

(*a*) One of the common bats (pipistrelle), with wings extended; (*b*) Australian flying fox, or fruit bat; (*c*) same as (*b*), in sleeping position.

All European bats are small and have a mouse-like skin. Extending from thumb to toe is a delicate membrane forming the wings, the forearm and fingers forming ribs like those of an umbrella. It has been discovered that this flying membrane and parts of the skin on the face are very sensitive to touch. The thumb of each hand has a sharp nail which the bat uses to cling to trees. With its wings at its sides the bat very much resembles the monkey, but walking is difficult as its knees bend backward.

Many bats are remarkable for having a curious growth on the nose, shaped something like a horseshoe. In some bats these growths resemble leaves, and in one species the entire nose looks like a flower. During the day this strange little animal remains in caverns, in crevices of ruins, hollow trees or other lurking places. At night, like a ghost, it flits out in search of food, which consists chiefly of insects. In a voice high-pitched and squeaking, its call carries far on the still night air. When the mother bat leaves her shelter, her young either cling to her neck and are taken along, or she leaves them on a tree, hanging safely hidden by leaves. We should not fear the bat as a harmful goblin, but rather look on it as a helpful worker in the night, for the food it eats—the night insects and mice—are enemies of gardens and orchards. There are two species of South American bats known to suck the blood of other mammals, and hence they are called vampire bats (see VAMPIRE BAT), though the name has also been given to a species not guilty of this habit.

As winter approaches in cold climates bats seek shelter in caverns, vaults, ruined and deserted buildings and similar retreats, where they cling together in large clusters, hanging head downward, and sleep until the returning spring recalls them to life. The *brown bat,* the *heavy bat* of the Eastern states, the *big-eared bat* of the Mississippi valley, the *leaf-nosed bat* and the *lyre bat* are common species M.S.

BATANGAS, *bah tahn' gahs,* a seaport and capital of the province of the same name in Luzon, one of the Philippine Islands, about seventy-two miles south of Manila. It has an excellent harbor on Batangas Bay. Interesting features of the city are the former royal palace, the convent and the prison. Situated in the midst of a fertile territory, producing sugar, rice,

coffee, hemp, corn and fruits, its trade is very extensive. The chief manufactures are silk, cotton goods and abaca. It is a progressive city, and since American occupation numerous expositions are held there with a view to increasing its commerce. Population in 1920, 35,912.

BATA'VIA, the capital of the Dutch East Indies, a seaport of Java and the great commercial market of the Malay Archipelago. It is situated on the north coast of the island, on a wide, deep bay. The principal warehouses and offices of the Europeans, the Java Bank, the Exchange and other business buildings are in the old town, which is built on a low, marshy plain near the sea, and is intersected with canals. The Europeans reside in a new, much healthier and more attractive quarter, beautiful in its abundant foliage. Here is located one of the most magnificent botanical gardens in the world. Newer Batavia has good electric railways, steam tramways, electric lighting, telephones and water works; in public utilities and architecture it equals any city of the same size in Europe or America. The domestic and foreign trade is extensive, sugar, spices, coffee, rice and indigo being the chief exports.

The city was founded by the Dutch in 1619 and attained its greatest prosperity in the beginning of the eighteenth century. Its inhabitants are chiefly Malay, with a considerable mixture of Chinese and about 9,000 Europeans. Population, about 139,000.

BATAVIA, N. Y., the county seat of Genesee County, in the western part of the state, is thirty-six miles northeast of Buffalo, on Tonawanda Creek, and on the Erie, the Lehigh Valley and the New York Central railroads. The population was 11,613 in 1910 and 13,541 by the Federal census of 1920. The area exceeds three square miles.

Batavia is the seat of the New York State School for the Blind. It contains the county courthouse, county jail, the Richmond Memorial Library and Y. M. C. A. building and several club buildings. One of the most interesting features is the Old Holland Land Office, containing a museum of historical relics. The "Batavia Scheme," a method by which backward pupils receive individual instruction, originated in the schools of this city.

Among the important manufactures of Batavia are agricultural machinery, metal cans and tanks, clamps, preserved fruits and vegetables, cut glass, firearms, monuments, extracts and perfumes, automobile tires, shoes, vacuum cleaners, etc. Batavia was platted by Joseph Ellicott in 1801 and was incorporated as a village in 1823. It was the home of William Morgan, whose death in 1826 was charged to members of the Masonic Order because of his avowed intention to reveal Masonic secrets (see ANTI-MASONS). B. OF T.

BATES, ARLO (1850-1918), an American poet, novelist, essayist and teacher, was born in Maine. After his graduation from Bowdoin College, in 1876, he began a literary career in Boston, and in 1880 became editor of the *Sunday Courier.* During his thirteen years of service on that journal many of his novels and poems were published, and he also corresponded for the Providence *Journal,* the Chicago *Tribune* and the *Book Buyer.* In 1893 he accepted the chair of English in the Massachusetts Institute of Technology. Professor Bates' *Talks on Writing English* and *Talks on the Study of Literature* are clearly and interestingly written. Many of his graceful and picturesque poems may be found in volumes entitled *Berries of the Brier, Sonnets in Shadow* and *Under the Beech Tree.* Of his novels, probably the best-known is the story of a New England girl, called *The Diary of a Saint. The Pagans, The Philistines* and *Love in a Cloud* are other well-known novels.

BATES, BLANCHE (1873-), an American actress who became widely known to playgoers while starring under the management of David Belasco. She was born at Portland, Ore., and gained her first stage experience as a member of a stock company which toured the Pacific coast. Her real start in her profession, however, she owed to Augustin Daly, who in 1898 gave her a small part in *The Taming of the Shrew* in his New York company. Thereafter she made rapid progress, and her interpretation of the rôle of Mirtza in the *Great Ruby* (1899) created a sensation. Her characterization of Cigarette in *Under Two Flags,* was another notable success, but she has gained the widest renown in Belasco's production of *Madame Butterfly, The Darling of the Gods* and *The Girl of the Golden West.*

BATH, ENGLAND, a fashionable watering-place, and the chief city of Somersetshire. It is beautifully situated in a wooded valley along the Avon River, twelve miles southeast of Bristol and the Bristol Channel, and 108 miles west and south of London. The city was founded by the Romans in the first century A. D. They named it *Aquae Solis,* meaning the *waters of the sun,* and built many baths,

some of which have been excavated and found remarkably well preserved.

Modern Bath is one of the loveliest cities in England. The houses are of white stone and are built upon terraces at the feet of high hills which rise north and east of the town. Interesting features are the celebrated Abbey Church, one of England's fine specimens of the late Gothic style of architecture, the guild hall, and buildings connected with the baths. The city has grown about the hot springs rising near the river bank, which yield about 500,000 gallons of water daily. It reached the height of its influence and prosperity in the eighteenth century. It is now a parliamentary borough, and sends two members to Parliament. In 1921 the population was 68,648.

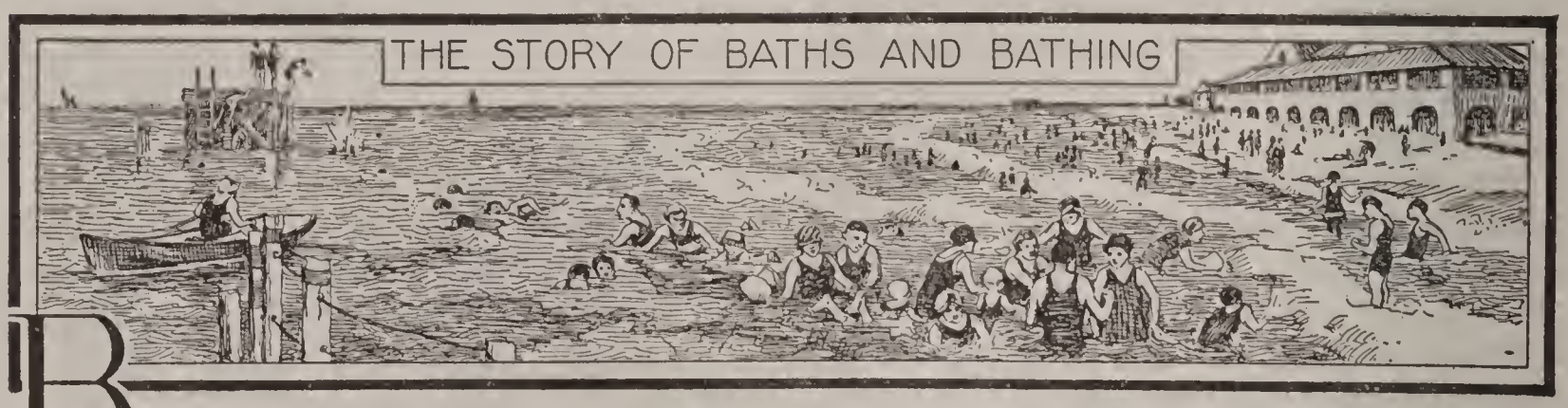
BATH, KNIGHTS OF THE. The Order of the Bath is the oldest order of English knighthood, but it is inferior in rank to the Order of the Garter, which is conferred only on noblemen (see GARTER, ORDER OF THE). The date of the founding of the Order is not known, but it was in existence in 1127 when, according to history, Henry I conferred knighthood on Geoffrey of Anjou. The recipient of the honor was required to bathe, the act being symbolic of the pure and cleanly life his knightly vows enforced. After falling into abeyance for more than a century, the Order of the Bath was revived by George I in 1725.

Until 1847 the order was military, but since that date this knighthood has been conferred by the king or queen on those deemed worthy of honor for services in the field of science, art or letters, as well as in the field of war. The Order comprises three classes, namely Knights Grand Cross of the Bath (G.C.B.), Knights Commanders (K.C.B.) and a lower order of Companions (C.B.). The holders of the two former titles are entitled to the prefix "Sir"; the lower class carries no title.

BATH, MAINE, is the county seat of Sagadohoc County, in the south-central part of the state. It is thirty miles south of Augusta, thirty-six miles northeast of Portland and is on the west bank of the Kennebec River, twelve miles from the sea. It is served by the Maine Central Railroad, electric interurban lines and by steamers which run to Boston, Portland, Augusta and Boothbay Harbor. The population in 1910 was 9,396, and 14,731 in 1920. The area exceeds thirteen square miles.

The city has an excellent harbor, and the river seldom freezes. The business section extends along the low waterfront for five miles; the residence section occupies higher ground. Bath has a public library, the state military and naval orphan asylum, two homes for aged persons, a hospital and a soldiers' monument. Shipbuilding, both of wood and of iron and steel, is the principal industry and several vessels, torpedo boats, gunboats and rams of the United States navy have been built here. There is a considerable coastwise and foreign trade in ice, coal, lumber, iron and steel. The principal industries relate to shipbuilding. There were in 1920, 38 manufacturing establishments, employing nearly $13,000,000 of capital; the value of their output was $19,377,000.

Settled about 1660, by Robert Gutch, a missionary to the Indians, Bath was first a part of Georgetown. It was incorporated separately in 1781, and in 1847 became a city.



BATHS AND BATHING. From an early period bathing has been practiced for cleanliness, health, comfort and recreation, either in the home or in public establishments. The ancient Romans considered the bath one of their luxuries, and erected magnificent public buildings in which to gratify their taste for this form of physical culture. Recent years have witnessed a revival of interest in the public bath, but there has been a new point of emphasis; for modern social workers consider it an important feature of their program for the uplift of humanity. Dr. Simon Baruch, who was the chief agent in securing legislation providing for compulsory municipal baths in New York state, has publicly stated that money spent for public baths does more to raise the standard of health and morality than a much

greater amount spent in any other way, and the Boston Bath Commission has reported that the greatest single agency in decreasing the number of juvenile arrests in Boston, during a specified decade, was the people's bath. It is this humanitarian feature of the modern public bath that sets it apart from public bathing of the Roman age.

Modern Public Baths. These may be grouped into two general classes—open-air baths and baths in buildings. The former are represented by bathing beaches, which are maintained by all large cities that have sea or lake water fronts, by bathing pools in city parks and by the less familiar floating baths. Enclosed bath houses have all the well-known devices for promoting cleanliness and providing recreation—bath tubs, shower baths and swimming pools—though not all of these are always found in one establishment.

During the warm season public bathing beaches are a wonderful boon to those city-dwellers whose bathing facilities are limited. Municipal beaches are sometimes operated free, but more often a fee of a few cents is charged for the use of bathing suit, locker and towel. As social workers have pointed out, these beaches not only provide wholesome recreation, but they have an educational value in that they encourage the bathing habit. Many persons who have patronized the beaches for the element of fun have learned the beauty and comfort of cleanliness.

Floating baths are most successful in towns on unpolluted bodies of water. Such a bath consists of a platform placed upon floats, and having in the center a pool surrounded by dressing rooms. By means of an ingenious arrangement of slats, the water circulates freely through the sides and bottom of the pool, and the bath may be moored at any suitable point along the water front. In cities where the rivers are polluted by sewage these baths are not desirable.

Indoor bathing is practiced both for recreation and for cleanliness. In the best-equipped bath houses there are shower or tub baths for cleansing the body, and a large pool for swimming. It is perhaps unnecessary to state that an enclosed swimming pool used for any purposes other than recreation could not be kept in a sanitary condition. Patrons of these pools are required to wash the body in a tub or under a shower before plunging in for the swim. A model swimming pool has the walls and floor finished in marble slabs, glazed tiles or other washable materials, a scum gutter runs along the sides at the water level to catch floating impurities, and there is a continuous inflow of pure water into the pool.

Considering its importance, the modern public bath movement was late in starting. The first bath house provided with hot and cold-water equipment to be established by a modern European city was one opened in Liverpool in 1842. At the present time every borough in Great Britain with a population of over 50,000 has municipally-owned bath houses, and the smaller cities are gradually adopting the idea. Germany, France, Austria, Norway and Sweden maintain them in the larger cities, and they are found throughout Russia, even in the small villages. In the latter country, however, sanitary conditions in connection with the public baths are often unsatisfactory.

In America public bath houses are less common than in Europe, because of the prevalence of bath tubs in private houses. In modern building, even the little cottage or apartment is provided with bathing facilities. In the crowded tenement districts of the larger cities, however, the provisions for keeping clean are woefully inadequate, and for this reason public bath houses, located as nearly as possible in the center of thickly-populated districts, should be found in every town where such conditions prevail.

In a recent survey of the progress of the public bath in the United States, it was found that New York, Chicago, Boston and Baltimore have done the most in the matter of establishing such baths; that a large number of manufacturing cities have taken no steps whatever to provide free or cheap baths for their working population; and that this is true of some cities having between 300,000 and 500,000 inhabitants. In a few instances baths have been installed in public schools; the first of these were provided in 1900 by the Paul Revere School of Boston. New York was the first state to pass a law making the erection of public bath houses compulsory. In 1895 all cities of more than 50,000 inhabitants were required to erect such establishments, to be open fourteen hours a day, and be provided with hot and cold water. Buffalo, in 1897, opened the first public bath house under that law.

The Turkish Bath. This is one of the most thorough cleansing baths known. In medieval times the religion of the Arabians made bathing compulsory, and the cleaning process which they originated has developed into a form of

bath that has become known by this name. The bather is exposed to high temperatures until his body is profusely covered with perspiration. It is then washed off with cold water, and the skin is rubbed with woolen cloths and smeared with soap or salve. The attendant at the same time rubs off the old skin particles, kneads the muscles and bends the joints (see MASSAGE). After the whole body is scrubbed with soap and warm water, it is dried with a haircloth, and the hard skin of the feet is rubbed off with pumice stone. The bather then reclines on a couch in a cooler room until his skin acquires its natural degree of warmth.

The soaping and rubbing processes of the Turkish bath free the skin of practically all its grease and dirt accumulations, and it is to be recommended for those in robust health. Those suffering from sciatica, rheumatism, sore muscles and various forms of lameness will find it beneficial, but it should be avoided by people with heart and kidney diseases. Never take a Turkish bath to break up a cold when it is in the fever stage, as there is then danger of contracting pneumonia. The Russian vapor bath is similar to the Turkish bath, but the perspiration is induced by throwing water upon glowing hot pebbles and permitting the steam to envelop the bodies of the bathers.

Bathing for Cleanliness and for Comfort. It is only by frequent washing of the entire body that one can keep the skin in a sweet and wholesome condition. About two and one-half million sweat glands are hard at work every day pouring out upon the skin the watery substance called perspiration, which contains water, oil and waste matter from the blood. This perspiration, in evaporating, leaves upon the surface of the body solid and oily matters, which if neglected will clog up the sweat tubes and interfere with the skin's work of eliminating waste matter. For this reason everyone should bathe frequently.

Just how often to bathe and what sort of a bath to take are matters that must be decided by the individual. Hot tub baths are said by many physicians to be weakening if taken oftener than twice a week, but doubtless there are many persons who suffer no ill effects from the daily cleansing bath in hot water. Whether it be a dip in tepid water or simply a sponge bath, daily washing of the entire body is a very commendable practice.

The bath in cold water is popular because of its tonic effects. The first effect of cold water is a sensation of cold, which causes the blood vessels to contract. Then follows the *reaction;* that is, the blood vessels open again, the warm blood flows rapidly through the body, the skin feels warm, and the bather, who finishes his bath with a brisk rub, experiences a delightful sense of exhilaration and well-being. Not all persons experience this reaction, however, and the cold plunge is usually the exclusive privilege of the vigorous. It should not be indulged in if the after effect is a prolonged sense of chill. Nevertheless, one can accustom the body to the effects of cold water by a gradual process, and even a cold sponge bath or a dash of water over the chest and shoulders every morning will be found a valuable help in preventing colds.

Baths for the Sick. Vapor baths are used in treating certain skin diseases, kidney trouble and chronic rheumatism. Carbonic acid gas mixed with water provides a highly-tonic bath that has been found helpful in cases of heart trouble, nervous ailments, insomnia, neuralgia, rheumatism and gout, and electric currents, made to pass through the body of the bather, are also employed by physicians for curing abdominal and intestinal troubles, sprains and contusions and other ailments. Electric-light baths, in which the patient is affected by the chemical and physical influences of the light rays, were introduced at Battle Creek (Mich.) Sanitarium in 1893. Such baths are strengthening, refreshing and stimulating.

Mud baths, consisting of applications to the body of warm or hot mud, usually mixed with sulphur or other mineral substance, are given to patients suffering from rheumatism. Another curative agent is the so-called *continuous bath,* introduced into America in 1873. The patient rests in the tub in a hammock or a blanket, with his body under water and his head out, the temperature of the water being about 95°. He may remain in the bath for hours, days, weeks or longer, according to his ailment. Patients suffering from certain skin diseases and affections of the joints have been kept in such baths for years. Insane persons and those addicted to alcoholic or drug habits are often quieted by this form of bath. Hot baths to relieve pain, reduce inflammation, control spasms and quiet the nerves, and salt rubs are other commonly-known methods of treating the sick.

The hot springs and medicinal springs in various regions of the earth attract many who are suffering from rheumatism and similar com-

plaints. The most noted hot springs in North America are those at Hot Springs, Arkansas (see Hot Springs, Ark.; Mineral Springs). Among the noted mineral springs of Europe are those at Baden, Carlsbad and Aachen, Germany; Spa, Belgium; and Teplitz, Bohemia.

Ancient and Medieval Baths. It would seem that civilized people have always believed in the bath, for Homer, writing ten centuries before the birth of Christ, mentions it as one of the first forms of refreshment offered to a guest. The Egyptians and Hebrews emphasized washing as a religious rite, and this idea was also common to the Greeks, who connected the bath with preparations for the sacrifices, for the reception of oracles, for marriage, etc. Public baths were maintained both by the

BATHS OF CARACALLA

The baths of Caracalla, still magnificent in their ruins, could accommodate 16,000 people at one time. The building measured about a mile around. Its various apartments were adorned with beautiful paintings, stucco work and statuary.

Greeks and Romans, and among the latter they reached a magnificence unheard of in modern times. The imperial thermae, covering enormous spaces in the heart of Rome, were a combination of library, gymnasium, garden, lecture room and bathing establishment, and those of Titus, Trajan, Caracalla and Diocletian are of time-honored fame.

When the culture of the Western Roman Empire gave way to the darkness of the early Middle Ages, the magnificent public baths were abandoned. Just how much bathing itself fell into disuse in Western Europe historians are unable to say, but it is known for a surety that all the luxurious customs connected with the Roman bath were preserved in Constantinople, the capital of the Eastern Empire, and were adopted by the Mohammedans. From the eighth century to the present time all the Mohammedan cities of the East have maintained public and private baths. B.M.W.

BATON ROUGE, *bat' un roosh',* La., the capital of the state, the seat of government for East Baton Rouge Parish and a port of entry, is situated in the southeastern part of the state and on the Mississippi River, eighty-nine miles northwest of New Orleans by rail, and 250 miles by water from the Gulf of Mexico. Transportation is provided by the Illinois Central, Saint Louis & San Francisco, Louisiana Railway & Navigation Company, and Southern Pacific lines, and by the Texas Pacific Railway through Port Allen, across the river. The population, which in 1910 was 14,897, had increased to 21,782 in 1920. The city occupies an area of two and one-half square miles.

Baton Rouge is built on the southernmost high land on the Mississippi River, safe from the destructive waters of the highest floods. It is a quaint, picturesque old city, with Spanish and French houses, tropical fruit orchards, and sugar and cotton plantations extending along the river bank. The state capitol is the most notable structure, and is unique among the capitols of the United States, presenting the appearance of an old Spanish fort or palace with the American flag waving from its tower; it replaces the one built in 1862. Because it is the capital city, many of the state's institutions are located in Baton Rouge; these include the penitentiary, the Agricultural Experiment Station, the State University and Agricultural and Mechanical College (1860), of which the Audubon Sugar School, for training in growing sugar cane and in making sugar, is a distinctive feature; and the state institutes for the blind and the deaf. Features of public interest are the city hall, post office, a plant for burning garbage, and a municipal abattoir, the latter operated under Federal supervision. The city has a national cemetery for soldiers. Besides the university there are, for higher education, Saint

Vincent's and Saint Joseph's academies, Southern University and Baton Rouge College (the last two for colored students), public and Hill Memorial libraries.

The city is a port of entry for home and foreign commerce, and any vessel entering the river at its mouth may safely ascend to this point. By far the greatest contributor to the wealth and industry of the city is the Standard Oil Company of Louisiana, the headquarters of the Stanocola products. The plant covers 450 acres, employs about 2,000 people, and is the industrial show-place of the city. There are also great printing houses, large sugar refineries, manufactories of molasses, cottonseed and lumber products, and pepper mills. In 1920 there were 50 manufactories, employing nearly $2,000,000 capital; the value of their products was nearly $4,000,000.

Baton Rouge was settled by the French and is one of the oldest settlements in the state. It became a British possession in 1763, as part of West Florida, and fell under Spanish government in 1779. In 1817 it was incorporated as a town. From 1849 until 1862 it was the state capital; then Shreveport was chosen for the Confederate seat of government, and in 1864 the Unionists made New Orleans the capital. The Louisiana Ordinance of Secession was adopted in Baton Rouge in 1861. In August of 1862 the Union forces successfully defended an attack by the Confederate forces, under General Breckenridge, though the Union leader, Brigadier-General Williams, lost his life. The city was reoccupied after a month and was held until the end of the war. It became the state capital again in 1882. In recent years its growth has been steady and in 1914 it adopted the commission form of government. B.M.A.

BATRACHIA, *ba tra' ke a,* a name originally given to an order of animals which included toads, frogs, newts and salamanders. The name means *froglike.* Batrachians live on land and in water, and they are now all included in the family *Amphibia,* a name meaning *double life.* Since the latter name is more expressive of the chief characteristic of these animals it is preferred to the old name *batrachia.* See AMPHIBIANS.

BATTALION, *ba tal' yun,* a term used in nearly every army to denote a unit of military organization, consisting of a body of troops whose numbers vary according to the standard of the army to which they belong. In the United States a battalion consists of four companies with a total of 1,000 men. A British battalion has 1,000 men, divided into eight companies. German battalions in war time number 1,002, in four companies. French, Austrian and Italian battalions have practically the same formation as those of Germany.

BATTENBERG, *bat' en berg,* a princely family of Prussia which has played a part in the history of Bulgaria, of England and of Spain. Prince Alexander of Hesse, who married Countess von Hanke, was given to understand that the marriage could be looked upon only as morganatic—that is, that neither his wife nor his children could share his possessions nor bear his title. In 1853, however, the countess was created princess of Battenberg, the name being taken from a little town of Hesse-Nassau; and her sons were accordingly known as princes of Battenberg.

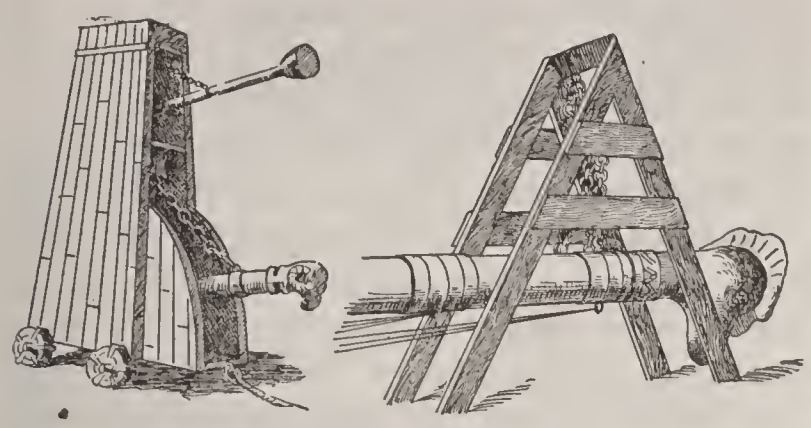
The eldest son, Louis Alexander, Prince of Battenberg (1854-), became a naturalized British citizen, and entered the British navy. In 1884 he married his cousin, the Princess Victoria, a granddaughter of Queen Victoria. His rise in rank in the navy was steady, and was based on distinguished services. In 1911 he was made second sea lord of the admiralty, and in the following year admiral of the fleet.

The second son of Alexander of Hesse was the Prince Alexander of Battenberg, who was chosen prince of Bulgaria when that country became self-governing in 1879. By reason of his real ability as well as his devotion to his adopted country he deserved well at the hands of the Bulgarians, but political troubles ran high, and in 1886 he was compelled to resign the throne.

A younger brother of the foregoing, Prince Henry Maurice, married the Princess Beatrice, daughter of Queen Victoria, and it was his daughter, the Princess Victoria Ena, who in 1906 became queen of Spain as the wife of Alfonso XIII.

BATTERING-RAM, a device of the days before the invention of gunpowder and heavy guns for battering down the walls of besieged places. As used by the Greeks and Romans, it consisted of a beam, or spar, with a massive metal head often shaped like the head of a ram, which suggested the name of the weapon. It was carried on the shoulders of a number of men who rushed it against the walls, or was suspended by chains to a beam set across two uprights. Sometimes the framework was mounted on wheels, which greatly increased its effectiveness. Often the ram was 120 feet or more in length, with a head weighing nearly

two tons, requiring 100 men to work it. The soldiers operating the battering ram were usually protected by a screen. During the siege



TWO FORMS OF ANCIENT BATTERING RAM

of Jerusalem the Romans used battering rams with terrible effect, no walls being able to withstand their constant blows.

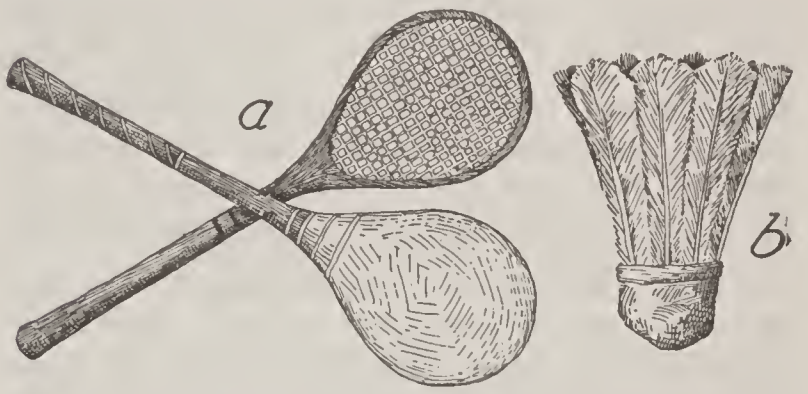
BATTLE, Trial by, or Wager of, a custom of the Middle Ages of proving the innocence of one accused of crime by a solemn, judicial duel fought between the accused and the accuser, in the belief that God would give the victory to the right. Women and churchmen were forbidden to take part in these duels but might choose a champion to fight in their stead, and this fighting by proxy led to great abuse of the custom, for professional fighters were often trained and hired out to do battle. Introduced into England by William the Conqueror, the custom was not formally abolished by law until 1819. Wagner's music drama of *Lohengrin* centers around the idea of trial by battle, the white knight Lohengrin appearing in response to the prayers of Elsa, who has been falsely accused.

BATTLE CREEK, Mich., in Calhoun County, in the southwest part of the state, is twenty-two miles east of Kalamazoo, 165 miles east of Chicago and 121 miles west of Detroit. It is at the junction of Kalamazoo River and Battle Creek, and is on the Michigan Central and Grand Trunk railroads. Interurban electric lines connect with Detroit and neighboring cities and towns. The area of the city is nearly six square miles. In 1910 the population was 25,267; in 1920 it was 36,164.

Battle Creek is the home of Battle Creek Sanitarium (established in 1866). The institution includes a hospital, dormitories, homes for children and for the aged, and a college, and has a tabernacle with a seating capacity of 3,500. Prominent buildings of the city are the Federal building, the city hall, Post Tavern, Ward building, the public library and Y. M. C. A. building, the two latter the gift of Charles Willard; also a well-equipped hospital.

Largely due to the dietetic reforms of the Sanitarium, Battle Creek has become famous as a manufacturing center of breakfast foods and for publications of diet-reform literature. The city has extensive manufactories of threshing machines and other farm implements, traction engines and steam pumps, and produces also printing presses, hose fixtures, paper cartons and boxes. Extensive car shops of the Grand Trunk Railroad are located here. The city is in a rich agricultural section and has an important trade in grain, fruit, live stock and wool. Battle Creek was settled in 1831 and incorporated as a village in 1850. Trouble which occurred between surveyors and Indians at this point is a circumstance said to have given the city its name. A charter granted in 1859 was revised in 1900. The commission form of government was adopted in 1913. G.S.B.

BATTLEDORE AND SHUTTLECOCK, a game played with a small racket, called a battledore, and a shuttlecock made of a piece of cork, or other light material, with feathers fixed round the top. The racket may be covered with stout parchment or made of strings crossed and fastened as in a tennis racket. Two players stand facing each other a few yards apart and hit the shuttlecock back and forth as many times as possible without allowing it to touch the ground. The player who allows the shuttlecock to fall to the ground loses a point. A game may consist of any number of points agreed upon by the players.



BATTLEDORE AND SHUTTLECOCK

(*a*) Two forms of battledore; (*b*) the shuttlecock, which is not so large in proportion to the size of the battledore as the illustration would lead one to believe.

This mild but interesting sport is of very ancient origin, and has been popular in China, India and other Eastern countries for at least 2,000 years. A modern development of it is known as *Badminton,* and it is popular as an indoor winter pastime in England. The racket and shuttlecock are heavier than those used in the older game, and the rules of Badminton are similar to those of tennis. A net is placed across a marked court, and the shuttlecock is

sent back and forth over the net. It is usually played by four persons, two on each side of the net.

BATTLEFORD, a town in Saskatchewan, at the confluence of Battle and Saskatchewan rivers, on the Canadian Northern and Grand Trunk Pacific railways. It is ninety miles northwest of Saskatoon and 254 miles east of Edmonton. Battleford was one of the first settlements in the Northwest, and from 1876 to 1883 was the capital of the Northwest Territories. It is now the center of a judicial district and of a district of the Royal Northwest Mounted Police, and has a Dominion lands office and meteorological office. The courthouse, the town hall and the high school are conspicuous structures. The Battleford district is noted for mixed farming, and is also popular for hunters, duck and prairie chicken being abundant. Population in 1911, 1,335; in 1921, 1,229.

BATTLE HYMN OF THE REPUBLIC, a stirring popular hymn, much sung on national or patriotic occasions in the United States. It was written by Julia Ward Howe in 1861, to the music of the old song *John Brown's Body,* and the author herself has told how she happened to write it. She went, during the War of Secession, to watch a review of the Union troops, and later described her return to Washington in the following words:

"The road was so filled with soldiers that our return from the parade grounds was very tedious, and to pass the time away we sang *John Brown's Body.* Some of the marching regiments took it up and it was passed along the road until the echoes reverberated for miles. My pastor asked me why I did not put the spirit of the song into some gracious and expressive words. I told him I had tried. One morning soon after that I awoke suddenly, and the lines I wanted were running vaguely through my mind. I arose and put them down. They were published in the *Atlantic Monthly,* and the editor (James Russell Lowell) named it "The Battle Hymn of the Republic."

The first stanza runs as follows:

Mine eyes have seen the glory of the coming of the Lord;
He is trampling out the vintage where the grapes of wrath are stored;
He has loosed the fateful lightning of his terrible, swift sword—
His truth is marching on.

BATTLESHIP. See WARSHIP.

BATUM, or **BATOUM,** *ba toom'*, a Black Sea port belonging to Russia, to which it was given in 1878 by the Treaty of Berlin, with the condition that it should not be made into a naval station. That condition was later cancelled, and in 1886 Batum became an important naval and military depot, for its harbor is one of the most spacious on the eastern shore of the Black Sea. Its trade is very large, and it is the chief point of export for vast amounts of petroleum, wheat and manganese ore from Transcaucasia. Its population is about 40,000.

BAUCIS, *baw' sis,* **AND PHILEMON,** *fil' e mon,* an aged couple who, according to the old myth, were wonderfully rewarded for their kindliness and hospitality. One evening Jupiter and Mercury, who had been wandering about the earth in disguise and had been driven from a village by its unkind inhabitants, came to the cottage of Baucis and Philemon. The old couple, not recognizing their visitors, kindly received the gods and gave them the best from their frugal store. While they were at the table Baucis and Philemon were amazed to see that the milk pitcher was no sooner emptied than it was filled again. Realizing that they were entertaining divine and not mortal guests, they fell on their knees in worship. Their little cottage was then changed into a beautiful temple, of which they were made priest and priestess, and years later, when they were very, very old, they were changed into two graceful trees which stood beside the temple gates.

BAUXITE, *bo' zite,* a clay-like, non-crystallized mineral which is the source of aluminum. It is usually found mixed with iron oxide. In color it varies from white through yellow and brown to red. Eighty per cent of the American bauxite comes from Arkansas, and Alabama, Georgia and Tennessee produce the balance. There are large deposits in Ireland. The American deposits are excellent for the production of aluminum, and alum, the salts of which are used for dyeing. Another use for it has been found in the manufacture of fire bricks and crucibles. See ALUMINUM; ALUM.

BAVARIA, with the exception of Prussia, the largest state of the former German Empire. It was a kingdom and consisted of two distinct parts, Bavaria proper, on the extreme southeast of the Empire, with Austria-Hungary on the east and south, and Western Bavaria, or the Rhine Palatinate, which lies to the west of the Rhine River. The latter portion is only about one-thirteenth of the former kingdom, which has a total area of 29,501 square miles, but it has almost one-seventh of the entire population of 7,140,333, in 1919. South Carolina is a little larger, with about one-fourth the number of people.

Physical Features and Resources. The general article GERMANY includes Bavaria as well as the other states in its discussion of geo-

THE FORMER KINGDOM OF BAVARIA
Its location in the new Germany.

graphical features, resources and industries, but there may be mentioned here a few of its distinctive characteristics. It is almost entirely cut off from the surrounding states by mountains, within which lies a basin-like plateau of 1,600 feet elevation, broken by ranges of hills. Most of the country is drained by the Danube River, but in the northwestern part the drainage is toward the Main.

More than any other German state Bavaria is given over to agriculture, and many agricultural associations have aided in spreading advanced methods until the soil has been brought to a point of productiveness equaled in few other sections of the world. Grains, potatoes and hay are the principal crops, but hops also are raised in large quantities, for Bavaria is the greatest beer-producing spot in the world. The yield for years has averaged over 420,000,000 gallons annually, or a million and a third gallons every working day.

Government. Though a part of the German Empire, Bavaria was independent in internal affairs and had its own hereditary monarch. The king was the sole executive, but he was assisted by a Cabinet of seven ministers who were responsible to the people for his acts. The legislative body was known as the *Landtag,* and consisted of two houses, a Chamber of Councilors of the Realm of about ninety members, all hereditary or appointed for life, and a lower house of 163 elected members. When Germanic arms were defeated in November, 1918, the king and royal house abdicated and fled. In September, 1919, it was impossible to forecast its form of government.

The principal cities are Munich, the capital; and Augsburg, Nuremberg, Wurzburg and Ratisbon. They are described in their alphabetical places in these volumes.

History. The inhabitants of the territory now known as Bavaria were Celts at the time the country first engaged the attention of historians (see CELTS). The Celtic tribe was conquered by the Romans about 15 B. C.; in the eighth century the Franks gained control, and Bavaria was included in the empire of Charlemagne. After his death and that of his descendants, it was constituted a duchy, and in 1180 was transferred to the family of Wittelsbach, a member of which is still the ruling sovereign. The Rhinish Palatinate came into the possession of the same family in the next century; the connection between these two parts of the kingdom is thus an old one, though it has at various times been broken. One of its dukes was for a brief time (1742-1745) emperor of Germany. See PALATINATE.

Its Years as a Kingdom. Napoleon made of Bavaria a kingdom in 1805, and increased its territory because its king furnished him an army, and although a portion of this land had to be given up at the final adjustment after Napoleon's fall, the new kingdom was considerably larger than the old duchy. A constitution, which with certain changes is still in force, was adopted in 1818, but the people did not receive from it the larger liberties which they had expected. This was largely owing to the inability of successive kings to realize the needs of the country.

Through jealousy and other causes, Bavaria opposed the efforts of Prussia to unite the German states under its own headship, and in the War of 1866 took sides with Austria. As a result it was made to give up a generous slice of territory and to form an offensive and defensive alliance with the victorious Prussia. Compelled by this alliance and the feeling of the people, Bavaria took part in the Franco-German War in 1870 and at the close of the struggle took a leading part in the formation of the German Empire. For a time the kingdom was most unfortunate in its sovereigns. Louis II went insane and killed himself in 1886, and his brother, Otto I, was also declared incapable of ruling because of mental infirmity. In 1913 the regent, Prince Ludwig Leopold, was proclaimed king as Ludwig III.

In times of peace Bavaria had control of its own army, but in war times this passed under the sway of the Empire. When the War of

the Nations broke out in 1914 Bavaria was prompt to send its quota of troops, and the Bavarian contingent under Prince Leopold, brother of the king, was the first to enter Warsaw when that city fell to the Germans in 1915. See GERMANY. O.B.

BAYARD, *ba yar'*, PIERRE DU TERRAIL (known as *Chevalier Bayard*) (1476-1524), a French knight whose chivalrous virtues won him the title of "the knight without fear and above reproach." Unlike most characters of medieval history and legend, he satisfies the standards of the most critical modern historian by reason of his bravery, his generosity and his unblemished honor.

He served under the French kings Charles VIII, Louis XII and Francis I, and under all of them achieved wonderful successes over the Italians, Spaniards and English. One of his most famous exploits was the defense of a bridge at Garigliano, in 1503, against the assaults of 200 Spaniards. The brilliant victory at Marignano, 1515, was won largely through his efforts, and Francis I bowed before him after the victory to receive knighthood from him.

BAYARD, *by' erd,* THOMAS FRANCIS (1828-1898), an American statesman, of a family distinguished for ability. His grandfather, James Asheton Bayard (1767-1815), and his father, of the same name (1799-1880), were United States Senators, and young Bayard was brought up in the best traditions of the Democratic party, to which they belonged. He was born at Wilmington, Del., studied law with his father, and while still a young man acquired a reputation as an attorney. With his father, he opposed the War of Secession, feeling that though the South did wrong to secede, the North also did wrong in trying to prevent secession by force.

Elected to the Senate in 1869, to succeed his father, he became a leader among the Democrats, and was several times mentioned as a possible candidate for the Presidency. President Cleveland made him Secretary of State in 1885, and he served with credit during the Bering Sea trouble and other crises. In 1893 he was made ambassador to Great Britain, and was the first to bear that title, all our former representatives there having borne the title of minister plenipotentiary and envoy extraordinary. The House of Representatives passed a vote of censure against him for certain criticisms of his home country while he held this post, but he is regarded as among the very able statesmen the country has produced.

BAY CITY, MICH., the county seat of Bay County, is in the eastern part of the state at the head of navigation on the Saginaw River, four miles from the south shore of Saginaw Bay. Detroit is 108 miles southeast; Saginaw is thirteen miles south. Bay City is served by the Michigan Central, Pere Marquette, Grand Trunk, Detroit & Mackinac and the Detroit, Bay City & Western railroads, and by electric line to Saginaw. Steamers ply between this and other lake ports. In 1910 the population was 45,166; in 1920 it was 47,554.

Bay City and West Bay City, on opposite sides of the river, which is here spanned by several bridges, were consolidated in 1905. The area of the city is about ten square miles. It has six public parks, a Federal building, a city hall, erected at a cost of $200,000, a public library and the Bay County Bar Library, a state armory and a Masonic Temple. The industries include ship and yacht building, lumber and planing mills, box factories and other large wood-working plants, a chicory plant, and manufactories of mill supplies and machinery, salt, sugar, alcohol and chemicals. The importance of coal mining and shipping is increasing and there is an extensive trade in lumber and other manufactured products.

Bay City was settled in 1836, was incorporated as a village in 1859 and became a city in 1865.

BAYEUX TAPESTRY, *ba yu' tap' es tri,* the most remarkable and costly embroidery remaining from early medieval times, picturing in a series of scenes the life of Harold and the invasion and conquest of England by William

SECTION OF BAYEUX TAPESTRY

the Conqueror. Tradition asserts that it is the work of the latter's wife, Matilda, and that it was made for Odo, bishop of Bayeux, as a decorative hanging for his cathedral, where it was found. It is 230 feet long and about twenty inches high, and contains 1,512 figures with inscriptions in Latin, worked in red, green,

blue and yellow wool, on a white canvas foundation. Authorities do not hesitate to consult it for details as to the manners and costumes of the time which it represents. (See WILLIAM I, THE CONQUEROR.) The tapestry has been preserved in good condition, and is still kept in the library in the town of Bayeux.

Bayeux is a very old town, and its life centers about its fine cathedral, said to be the most ancient in Normandy. It is in the Aure valley, about five miles from the English Channel, and has a thriving agricultural trade, besides manufactures of porcelain, lace and calico. Population in 1911, 7,638.

BAY'ONET, a sword-like blade attached to the barrel of a rifle, deriving its name from the town of Bayonne, in France, where it was invented in the fifteenth century. At first the bayonet had a handle which was thrust into

THE MODERN BAYONET

the gun barrel, but very soon it was improved so as to fit around the barrel and thus cause no interruption in firing. Before the War of the Nations the bayonet had fallen almost into disuse in civilized warfare, but in that conflict it proved a terrible weapon in the hand-to-hand fighting in the trenches. The British and United States infantry are supplied with a bayonet twenty inches in length, while French and German bayonets are several inches longer. The bayonet, when not fixed to the rifle, is worn in a leather scabbard attached to a belt and suspended on the left side of the body.

BAYONNE, *bay' yohn,* N. J., located in Hudson County, and one of the leading industrial cities of the state, is noted especially for its large petroleum and coal interests. It is situated on New York and Newark bays, on the northeastern coast of the state, and is separated from Jersey City on the north by Morris Canal and from Staten Island on the east by Kill van Kull. New York City is six miles northeast. The city is served by the Central Railroad of New Jersey, and electric lines operate to Jersey City. In 1910 the population was 55,545; in 1920 it showed a remarkable increase, being then 76,754. The city is four square miles in area.

Bayonne is an attractive residential city, and the excellent railway accommodations induce many New York merchants to make it their home. The Hudson County Boulevard passes through the city. On Kill van Kull are located the immense Port Johnson Coal Docks, where several hundred people are employed in shipping coal. The city has the largest plants of the American Radiator Company and of the Standard Oil Company; the petroleum refineries of the latter are connected by pipes with the oil fields of Pennsylvania and with several of the leading cities on the Atlantic coast. Besides these immense industrial plants, there are large color-paint and chemical works, smelters, motor-boat, structural-iron and insulated-wire factories, and silk mills

The city of Bayonne includes the former villages of Centerville, Bergen Point, Bayonne, Pomrapo and Constable Hook. Originally it was a part of Bergen, but became a separate township in 1861. In 1869 it became a city and was rechartered in 1872.

BAYREUTH or **BAIREUTH,** *bi roit'*, a town of Bavaria, Germany, fifty-eight miles northeast of Nuremberg, of undying fame and interest because of its associations with the great composer Richard Wagner (which see). On the street named for him may be seen the home of the musician, with his grave in the garden, but his most interesting memorial is the famous Wagner Theater, opened in 1876, and devoted entirely to the performance of his music-dramas. The theater is built on a height overlooking the town, and has leading to it a broad avenue of shade trees. In connection with the theater is a school for training young people to take part in the Wagner music festivals, which are held nearly every year and which attract music-lovers from all over the world. Bayreuth also contains the graves of Franz Liszt and Jean Paul Richter, and a monument to the latter has been erected in the cemetery.

Bayreuth is a town of some importance as a railway and trading center. Woolen, linen and cotton goods, leather, earthenware, musical instruments and tobacco products are manufactured, and there are several breweries, distilleries and brick kilns. Its important buildings include the palace of Duke Alexander of Württemberg, the old opera house, the town hall, a riding school, and a famous old church dating from 1439. There are a number of educational and charitable institutions. Population in 1919, 33,128.

BAY RUM, a widely-used liquid toilet preparation, made by mixing the oil of bay with alcohol and water, and adding small amounts of the oil of orange peel and of allspice, to improve the odor. The oil of bay is obtained

by distilling the leaves of the bayberry, a West Indian tree of the myrtle family. Bay rum is chiefly used by barbers, hair-dressers and perfumers. It is also sometimes used as a liniment to relieve pain in rheumatism. Bay rum is made in the West Indies by distilling rum in which bay leaves have been steeped.

BAY TREE, the name of several related trees which have been famous in literature and history. The *Psalms* speak of "the wicked spreading himself like a green bay tree," and the ancient Greeks used sprigs of bay, or laurel, as it was called, to crown the victors in their great games (see OLYMPIC GAMES). In this sense it is still used figuratively; a poet is said to have "won his bays" when he gains praise and renown.

The *sweet bay,* which was the victor's laurel of the ancients, is an evergreen tree which is native to the Mediterranean countries, but is also grown in the warmer parts of North America. Its aromatic leaves are often used as a seasoning. The best-known bay of America, however, is the *white bay,* a member of the magnolia family, which with its shining evergreen leaves is highly ornamental. California also has a bay tree which yields a valuable lumber.

BAZAR or **BAZAAR,** *ba zahr'*, an Oriental market for articles of all sorts, in which traders maintain small stalls or shops. Sometimes a bazar is confined to a single narrow street; at other times it may spread out through a number of streets, all perhaps covered. Gossip is carried on quite as much as trade, and bazars form the setting for many of the tales of the Arabian Nights. In America the name bazar has come to mean a sale of various objects, mostly home made, for philanthropic purposes.

BEACH, REX (1877-), an American writer whose stories of adventure, published originally in magazines and later in book form, have given him a place among America's popular novelists. He was born at Atwood, Mich., studied at Rollins College, Fla., and afterward fitted himself for the profession of law. The success of various short sketches sent to the magazines determined him, however, to give his time to the writing of tales rather than to the trying of cases, and with the appearance of *Pardners* and *The Spoilers* he made many friends among the reading public. *The Spoilers,* in particular, a vivid story of Alaska life, made certain his literary career. His stories are clean and vigorous, and have an ever-present touch of humor which distinguishes them from much of the late fiction. *The Barrier, Going Some, The Ne'er-do-Well, The Net, The Iron Trail* and *Oh, Shoot!* are titles of his recent books. Several of his stories have been dramatized; others have been shown in moving pictures.

BEACON, N. Y., comprises the villages of Fishhill Landing and Mattewan, incorporated as a city in 1912. It is situated in Duchess County, in the southeastern part of the state, and is on the Hudson River. New York is fifty-nine miles south, and Poughkeepsie, the county seat, is sixteen miles north. The New York Central, and the New York, New Haven & Hartford railways afford transportation facilities, and Newburgh, across the river, has ferry connection. Fishhill was founded in 1700 and was named for *Dutch Fish Creek.* Mattewan was settled in 1804. The population of the combined villages was 10,996 in 1920, and was chiefly American. The area is a little less than five square miles.

Beacon is picturesquely located on a river famous for its beautiful scenery. Beacon Hill, or Old Beacon, one of the highest monuments of Hudson Highlands, 1,500 feet, is in the vicinity. The city claims the distinction of being the first in the state to adopt the commission form of government. It is actively engaged in the manufacture of engines, boilers, rubber goods, hats, tools and bricks. An embroidery company is possibly the largest industrial plant, having about 1,000 employees. The most notable buildings are the State Hospital for the Criminal Insane (Mattewan), the New Hospital and the Highland Hospital. The De Garmo Institute is located here, and there is a city library. L.H.W.

BEACONSFIELD, EARL OF. See DISRAELI, BENJAMIN.

BEADS, *beeds,* small ball-shaped objects of every conceivable color, made of metal, coral, amber, ivory, stone, glass, wood and other substances, and used in a great variety of ways. As jewelry, they are strung on threads to form necklaces and bracelets. Rosaries are strings of beads used in counting prayers; it is interesting to note in this connection that the term *bead* comes from a word common to the Teutonic language, which signifies *to pray.* Tiny beads are sold in the shops in skeins, to be knitted or chrocheted into the beadwork so popular at the present time for making bags, purses, watch fobs, candle shades and numerous other articles. Wooden beads, brightly

colored, are familiar objects in the kindergarten.

Beads have been commonly used for centuries as barter among savage races. The Indians who traded with the New England colonists made beads of wampum (which see) so beautiful that they had a fixed price, three black beads or six white ones being worth one English penny. The wampum beads were drilled out of a shell by means of a wooden shaft which had a point of jasper or flint. The Western Indians fashioned beads of rainbow-colored abalone shells, found along the Pacific coast.

Seeds, beans and berries are natural beads that the children love to string into chains. Black-eyed Susans and tiny scarlet beans tipped with black make especially gay necklaces. Job's-tears, the hard, tear-shaped seeds of the grass known by that name, ranging in color from pearly white to black, are perhaps the most commonly used of nature's beads.

The girl who is interested in bead work will find simple and clear directions for using beads in the book, *Three Hundred Things A Bright Girl Can Do.*

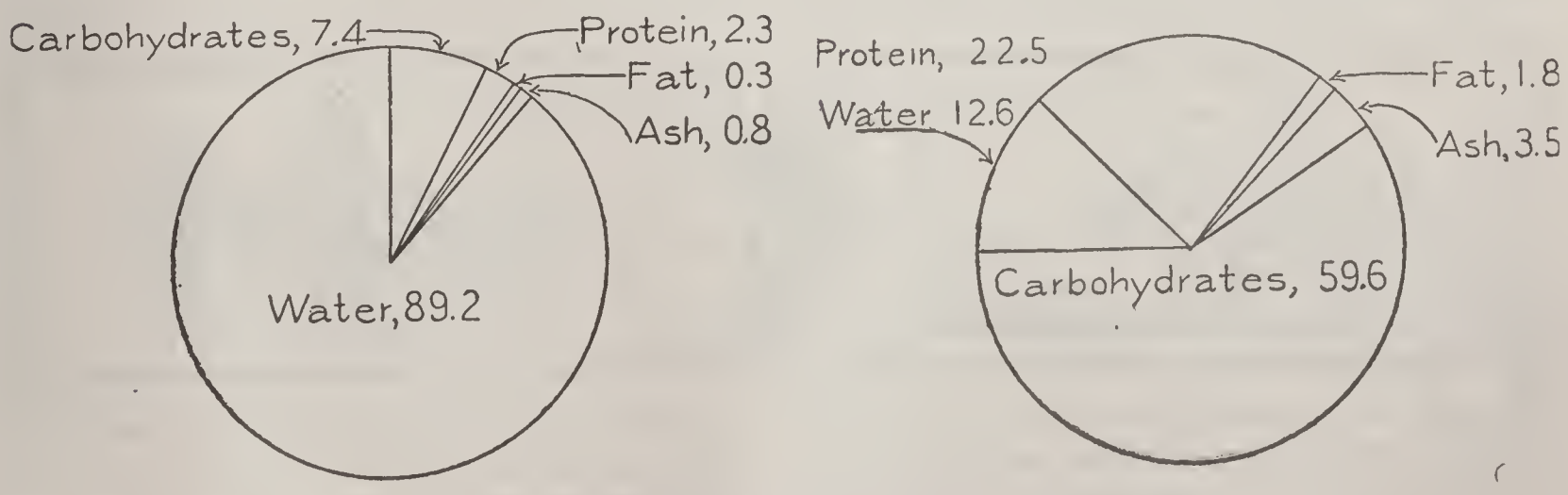
BEAM, *beem,* a horizontal timber or bar of iron or steel, supporting weight in a structure of any sort. In the article BRIDGE will be found pictures illustrating the way in which beams break under loads, and showing why steel beams are commonly given the form of the letter I.

There are several minor uses of the word beam. In the familiar expression describing a rolling ship as *on its beam ends,* the reference is to the beams on which the deck rests. The beam of a balance is the bar which supports the scales; see BALANCE, where there is an illustration. A loom has a wooden cylinder on which the weaver winds the warp previous to weaving, and one on which the woven cloth is rolled; both are called beams. The bar which draws a plow is a beam.

BEAN, the name given to various plants which provide one of the most important vegetable foods for man, as well as excellent forage for cattle and nitrogen for the soil. Some bean plants are short, stocky shrubs, others are climbing vines, and the seeds, also called beans, vary in size, shape and color. The flowers, however, whatever their color and size, are alike in shape, the most insignificant blossom on the garden bean being almost exactly like the bright-red winged flowers of the scarlet runner, which is grown not for its seed but for its beauty. The seeds of all varieties are borne in pods, and this, with the butterfly shape of the blossoms, shows that the bean belongs to the same family as the pea—the pulse family.

Food Value. As stated above, beans, whether green or dried, have a high food value, and it has been estimated that in no other form can so much nutriment be bought at so low a price as in the so-called navy beans. It is for this reason that these beans form one of the staples dealt out by charity organizations to their dependents. Because beans are rich in protein (which see), they are particularly well adapted to take the place of meat, and when baked beans are served it is wise to omit meat from the bill of fare. Frequently the statement is heard that the Japanese and Chinese live largely upon rice, and thus have a diet deficient in protein, but the soy bean in some form, perhaps merely as a sauce for the rice, is present at almost every meal and supplies the very necessary protein element.

Kinds of Beans. In the United States and Canada the best-known of all beans is probably the *kidney* bean, of which many varieties are cultivated. These include not only the familiar red kidney bean, but almost all of the



AVERAGE FOOD VALUES
At left: Green string beans. At right: Dry navy beans.

so-called "string" beans, whether green-podded or wax-podded, of which the entire pod with its unripened seeds is eaten. To the kidney beans, too, belongs the *navy* bean, the basis of the famous "Boston baked beans" which, with its invariable Boston brown bread, come to the table of so many New Englanders every Saturday evening.

The *lima,* introduced from Peru, as the name indicates, is another important bean, distinguished by its slender vine-like growth and its large pods with their broad, flat seeds. These are much used both when green and when dry.

GOLDEN WAX BEAN

In Mexico there is a little dark-colored bean, called the *frijole,* which may almost be said to constitute the national dish. From the tables of the poor especially, these beans, highly seasoned with red peppers, are rarely absent.

But America is not the only country which produces important beans; from China and Japan have been introduced the *soy* bean, which is in those countries a staple food article. In America this bean is grown, however, chiefly as forage and as a restorer of nitrogen to the soil; for it has in even greater measure than most members of the pulse family that peculiar ability to take nitrogen from the air and store it in little tubercles on its roots (see AGRICULTURE, subtitle *Agricultural Education,* page 100; NITROGEN; FERTILIZERS).

Enemies. The bean has one very dangerous insect enemy—the bean weevil, a little dark-gray beetle which lays its eggs on the growing pods. The damage done by the grubs to the green plants, however, is small compared with that which they do to the dried seeds, and it is always safest, before storing these, to immerse them for a short time in water at 140° F. This does not harm the beans and it destroys the pests.

Another enemy of the bean is the fungus disease called *anthracnose,* which causes considerable damage to growing beans by shriveling the pods and discoloring the seeds. Investigation has shown no very satisfactory method of dealing with this pest, and the greatest care should be exercised in selecting seed for planting, as the disease is transmitted from generation to generation.

World Production. Italy is the most important bean-producing country of Europe, with an annual yield of about 16,600,000 bushels. Spain, producing nearly 11,800,000 bushels, Austria, about 8,725,000, and the United Kingdom, about 7,842,000, are next in order. The annual yield of the United States is over 11,145,000 bushels; Canada produces about 827,000 bushels, on 46,300 acres. The largest crop, by far, is harvested in the province of Ontario. Chile is the most important South American country in the production of beans, raising each year about 1,550,000 bushels.

A.MC C.

BEAR, to dwellers in North America, probably the most interesting and certainly the best-known of all the larger wild animals. There are three reasons for this. First, bears have always been plentiful in all parts of the continent where civilization has not pressed too closely; second, they remain well and strong in confinement and are thus to be seen

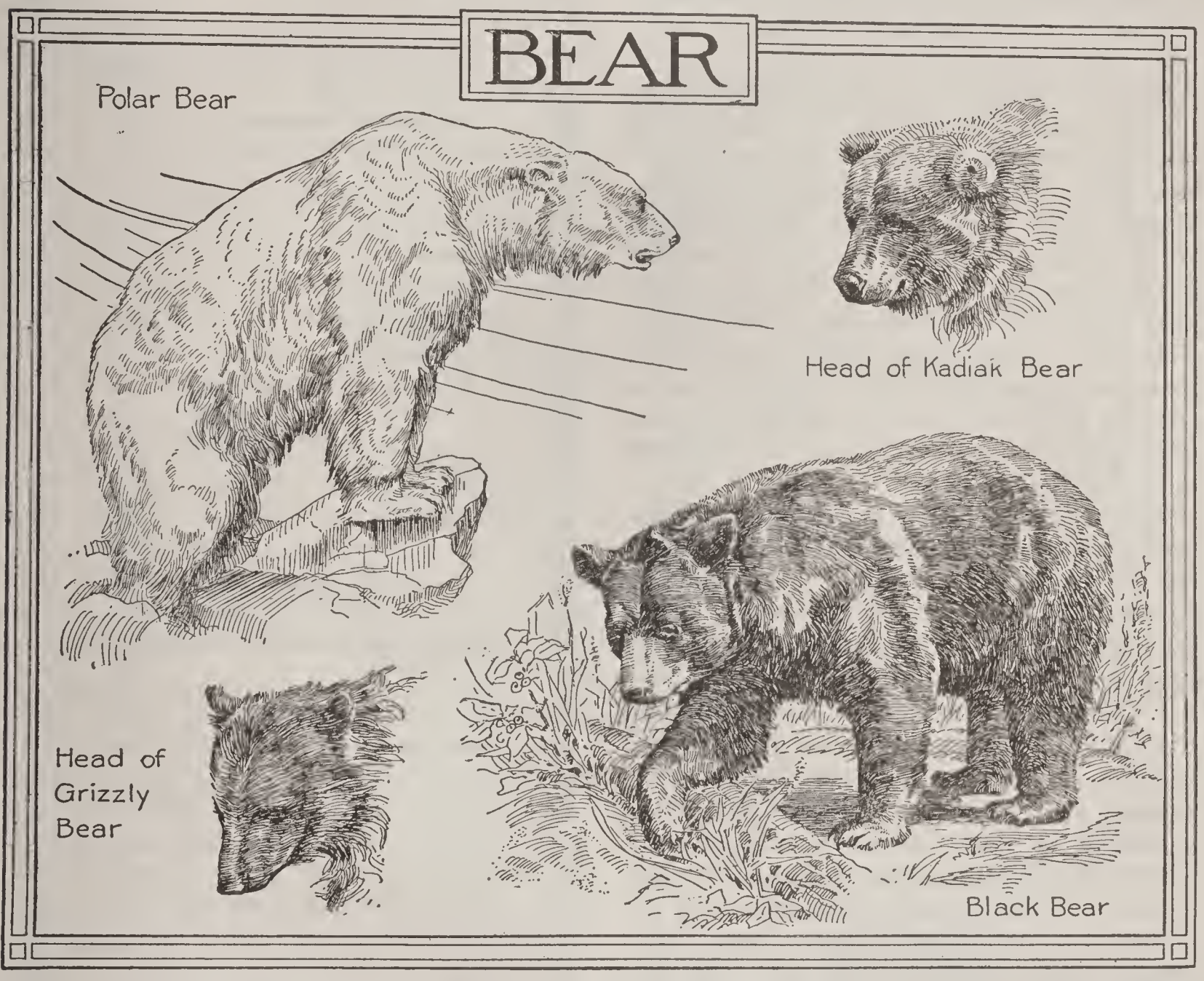
in any zoo, no matter how small it may be; and third, they are easily trained and taught to do many simple things.

Appearance and Habits. Bears are shaggy beasts, much like huge dogs, but they have more massive bodies, broader heads, and teeth fitted for grinding as well as for tearing. Their bodies look more bulky than they really are, by reason of the loose skin, long, coarse hair and short legs; and since they walk flat on the soles of their feet instead of on their toes, they have none of the lightness and gracefulness of movement which distinguishes other flesh-eaters—the dog family and the cat family, for instance. But their awkwardness is apparent rather than real, for they can move very rapidly, over either smooth ground or steep and dangerous rocks, and most of them can climb a tree with astonishing ease and nimbleness. This, however, is not true of the grizzly bear, which is not a climber.

The bears are classed as flesh-eating animals, though they have excellent general appetites and can eat almost anything. Small animals of the woods, lambs and little pigs from unprotected farms, fish, grubs and eggs are most attractive, but if these are not at hand fruits, nuts, herbs and roots form a satisfactory substitute; and honey appeals so strongly to their taste that they will risk getting well stung in order to make a meal of it. Their sense of smell is very well developed; hearing, moderately so; but their little eyes do not serve them well.

Unlike the wolves and foxes, the bears do not live and hunt in packs. Kipling in his *Jungle Book* was true to nature when he gave to his wolves the "law of the pack," but made his great bear a solitary creature. A bear family has its cave in some rock crevice, under heavy brush, or in a hollow tree, and there they spend the winter, not exactly torpid, but half asleep and needing little if any food. In the spring the young ones, usually two in number, are born and the mother takes the greatest care of these until they are fairly large cubs. There are few animals more dangerous to meet than a mother bear angered by any injury done to her cubs.

In spite of much that is said to the con-



trary, most bears are not cowards. Bret Harte, who lived in the western country, and should have known whereof he spoke, wrote of the grizzly as "Coward, of heroic size," but hunters agree that a bear is no enemy to be laughed at. Most bears are good-natured, it is true, and do not begin a fight unless they are provoked to it or fear that their young are in danger; but once aroused they show a tremendous strength against which little but a quick-shooting rifle can prevail.

The "bear's hug" is a very real thing, and natives of the countries where bears live know this and prefer to capture or kill the animals during the winter season, when they are sleeping or are at least sluggish.

Value to Man. Uncivilized peoples have always regarded bear's meat very highly, and the most modern of hunters find that it is of fine flavor. The fat, moreover, is of use, for though "bear's grease" is no longer popular for the hair as it was two generations ago, other ointments are made from it; but the skin is the most valuable part of the animal. The skins of large bears, carefully dressed and mounted, bring good prices, $1,000 being no uncommon price for a fine polar bear rug, while a grizzly bear rug will sell for a quarter or a half that price.

Winter Habits. While the statement is commonly made that the bear hibernates, or passes the winter in a state of stupor, this is not true in the sense in which it is true of the snake, for instance. (See HIBERNATION.) In cold countries most bears do retire to their caves and there sleep through the winter, waiting the return of spring and a new food supply, but they do not become torpid. The hibernation of the female is much more complete than is that of the male, which frequently prowls about at night during even the coldest weather. When the female comes out in the spring she is very thin and almost unable to walk. The grizzly bear hibernates very little, and the polar bear, despite the coldness of its dwelling place, not at all.

Kinds of Bears. Almost all the bears live in North America, Europe or Asia, though South America has one species, the Andean, and Africa has the Atlas bear.

Most distinctive of all the species is the *polar* or *ice bear* of the Arctic regions. It is a wonderful example of the adaptation of an animal to its surroundings, for its creamy white color allows it to creep practically unseen upon its prey, which would quickly be aware of an

Outline and Questions on the Bear

I. Appearance

(1) Size and shape
(2) Loose skin; long hair
(3) Apparent awkwardness

II. Habits and Senses

(1) Food
  (a) Flesh
  (b) Other food
(2) Special senses
(3) Solitary habits
(4) Strong mother instinct
(5) Dangerous enemy when aroused
(6) Winter habits
  (a) Period of stupor
  (b) Hibernation of female

III. Kinds of Bears

(1) Polar bear
(2) Grizzly
  (a) Silvertip
  (b) Cinnamon
(3) Brown bear
(4) Black bear
(5) Kadiak bear

IV. Value to Man

(1) The flesh
(2) The fat
(3) The skin

Questions

What kind of a bear is the "Bruin" of the stories?

How much is a large polar bear skin worth?

What sense guides a bear in its search for honey?

Why are bears better known than most wild animals?

Why are some people under the impression that bears are cowards?

What advantage to the polar bear is its color?

Why do farmers dislike the black bear?

What city in Europe is named for bears, and why?

What are the winter habits of most bears?

What book of Kipling's makes clear one peculiarity of the bear?

What is the largest of all bears? Is it dangerous?

How do hunters regard the grizzly?

When do natives prefer to capture bears?

In what way are the looks of a bear deceiving?

approaching enemy of any darker color. This is an exceptionally large bear, which often attains a length of nine feet or more and a weight of 1,000 pounds, and it has a long, pointed head, slender limbs, and large black feet. It lives chiefly on seals and fish, which latter it has little difficulty in catching, as it is an excellent swimmer. Polar bears are much seen in zoos, and seem to thrive in the temperate climates.

The *grizzly bear* of the mountains of Western North America is one of the largest and most savage of the family; indeed, hunters consider it the most dangerous animal of North America. Formerly it was to be found anywhere from the Black Hills of Dakota westward, and from Mexico to Northern Alaska, but the advance of civilization has forced it to withdraw to the high mountains and deep forests. Once it was the enemy of the buffalo and the deer, and to-day the cattle and horses of western ranches are not always safe from its raids. Unlike most bears, it does not sleep during the winter, but ranges day and night for its prey. The grizzlies vary in color, some being brownish-yellow, some gray and some reddish-brown. The two latter classes receive special names—the gray are known as *silvertips,* the reddish-brown as *cinnamon* bears. A full-grown grizzly may be nine feet or more in length and may weigh 1,000 pounds. Yellowstone National Park has some fine specimens which frequently come close enough to the hotels to be photographed by tourists.

The *brown bear* of Europe and Asia is the *Bruin* of the children's stories, for *Bruin* merely means *brown,* and this is the bear which is most often seen in menageries or with strolling musicians, who teach it to dance clumsily and to perform tricks. The children of North America are not so familiar with these performing bears, but every village of Europe receives frequent visits from the bear-tamers and their pets. It was this animal which in earlier days in England was so cruelly baited—fastened to a stake and compelled to fight a pack of dogs—and doubtless the "three bears" whom Goldilocks met in the wood were of this species.

The Swiss city of Bern takes its name, a shortened form of the German word for *bears,* from the tradition that many bears were killed on the day the city was founded; and to this day bears are kept by the city government in a den or pit in memory of this old story.

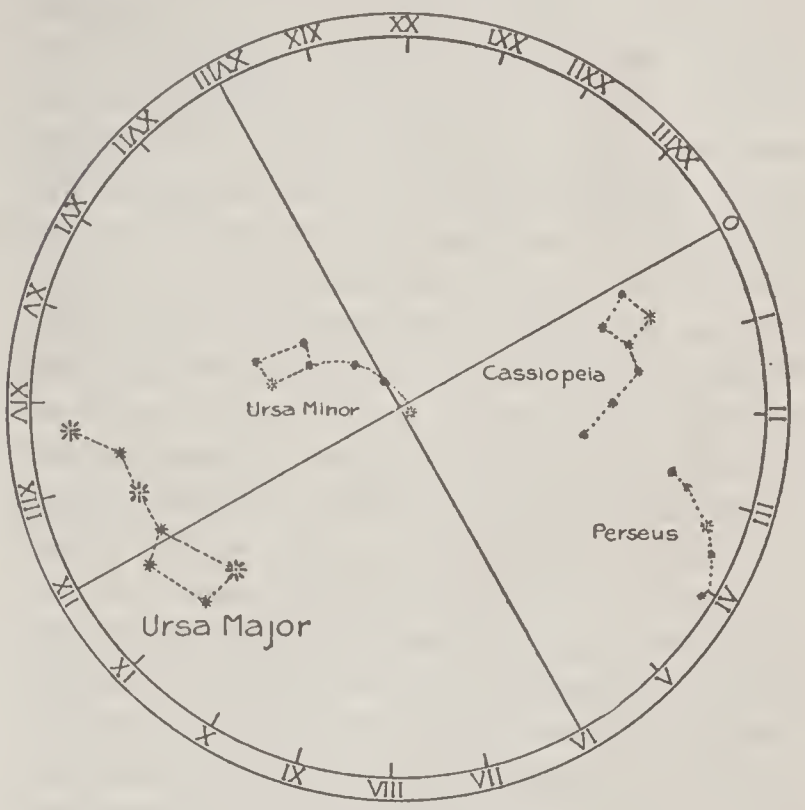
The *black* bear is to be found in almost any part of North America where large stretches of forest remain. It is smaller than the grizzly, and is not always black, many species being brown or reddish-yellow. Not dangerous unless enraged, the black bear is nevertheless hated and feared, for it is a persistent thief of pigs and sheep.

The *Kadiak bear,* the largest bear of all, lives on Kadiak Island, Alaska, and is related to the grizzly. While other species of bears are being gradually exterminated, this one is still numerous, and bids fair to remain so since it is one of the most dangerous of all beasts of prey.

V.L.K.

Consult Seton's *Life Historics of North American Animals;* Roosevelt's *The Wilderness Hunter.*

BEAR, GREAT, the name of the most conspicuous constellation in the northern heavens, called *Arcturus* by the Greeks, and usually named *Ursa Major* by astronomers. The Great Bear contains seven stars of the second mag-



GREAT BEAR
(See, also, full page drawings in ASTRONOMY.)

nitude, so arranged as to form the outline of a dipper-like figure with a handle of three stars. The two stars forming the end of the dipper are called *pointers,* as a line drawn through them and continued towards the Pole will almost touch the Pole Star. In the United States and Canada this group of stars is known as the Big Dipper, to distinguish it from the Lesser Bear, or Little Dipper, which contains the Pole Star. In England the Dipper is called the Wagon, the Wain and the Plow.

According to mythology, the Bear is Callisto, daughter of Lycaon, king of Arcadia, who, arousing the jealousy of Juno, was changed into a bear. Jupiter afterwards placed her in the heavens with her son Arcas, the Little Bear. The accompanying illustration shows the relative positions of the Great and Little Bear. Held with the month at the top its position will be approximately correct at eight o'clock in the evening.

BEARD, *beerd,* in modern usage, a term confined to mean the hair on chin and cheek. The word *moustache* is applied to the growth on the upper lip, but this was formerly included in the beard. As a woman's crowning glory is said to be her hair, so in ancient times was a beard regarded as a mark of full manhood. Slaves and eunuchs were beardless objects of contempt; women unfortunate enough to grow beards were regarded as witches.

Styles During the Centuries. The Egyptians, with intense love of cleanliness, shaved their faces except in times of mourning. The Greek philosophers were long-bearded men, thinking to derive added dignity from the luxuriant growth. Shaving was introduced into Greece by Alexander the Great, who ordered his soldiers to remove their beards, so that their enemies might not seize them in battle. Before the Norman Conquest it was customary for the Saxons to shave their chins and cheeks, but to allow their moustaches to grow. The Normans were clean-shaven, their hairless faces causing the Saxons to call them an army of priests. The Japanese for centuries shaved clean, but, even in Nippon, fashions change, and the emperor now wears beard and moustache. In the United States and Canada the beard is not fashionable, by far the greater number of men being clean-shaven, or wearing only a moustache. In the British army it is against the regulations to shave the upper lip, while in the navy, both beard and moustache must be worn or the face must be clean-shaven.

A Note from History. The beard appears a trivial matter to be the cause of a bloody war. Yet it is said that the shaving of the beard of Louis VII of France brought about a war with England that lasted 300 years. His wife objected to a beardless husband. The king divorced her and she became the wife of Henry II of England. The throne of France was afterwards claimed for her descendants.

BEARD, Daniel Carter (1850-), an American naturalist, artist and writer, who has come prominently before the public as founder of the first Boy Scouts' society, that upon which the English society and the national organization in the United States were modeled. When the Boy Scouts of America were organized they chose him as their national scout commissioner; he has also been president of the Camp Fire Club, an association of sportsmen, authors and artists, which is not to be confused with the Camp Fire Circle.

Beard was born at Cincinnati, O., studied at Covington, Ky., and at the Art Students' League in New York, and became known as an illustrator of books and magazine articles. He also had classes in art, that at the Woman's School of Applied Design being probably the first class ever organized in animal drawing. Mount Beard, near Mount McKinley, is named for him, though it is by no means certain that he discovered it. See Boy Scouts.

BEARS AND BULLS, names popularly applied to the two classes of brokers or operators on the stock exchange or board of trade. The name is applied to them because of the characteristic method of attack used by those animals. The bear uses his claws and tries to tear down his prey; the bull tosses it up with his horns. So a stock exchange *bear* is one who tries to force prices down, while a *bull* tries to raise the prices.

A *bear* sells stocks or bonds or grain in trying to create a larger supply than demand. If he succeeds, the price naturally falls, and he can buy back the securities at the lower price. His profit is the difference between the price at which he sold and the price at which he bought back the securities or grain.

The bull on the contrary is always trying to keep prices going upward. Like the bear, he buys when prices are low, but to make a profit he must force the price upward, whereas the bear always tries to drive prices below those at which he bought. The bull, who wishes to maintain or raise prices, must buy all that the bear offers. If he fails to do so the price will begin to fall. The whole thing is much like the seesaw which every child knows. When the bull is on the high end, that is, when prices are high, the bear tries to get off the seesaw—that is, he sells, in order to drop prices. When the bear is on the high end he makes every effort to get down, while the bull tries to keep him up. Both sides cannot be up at the same time, and when one side goes up the other must go down. If the general tendency of prices is downward, it is usually said to be a *bear market;* if the

prices are rising, it is a *bull market.* See Stock Exchange; Board of Trade.

BEATRICE, *be' a tris,* Nebr., county seat of Gage County, a manufacturing town situated in the heart of one of the best agricultural sections in the Middle West. The population in 1910 was 9,356; in 1920 it was 9,664. Beatrice covers an area of four and a half square miles. It is in the southeastern part of the state, forty miles south of Lincoln, ninety-five miles southwest of Omaha and 200 miles northwest of Kansas City.

The Big Blue River, on which the city is located, is the great asset of the community. It furnishes power for city lighting and factories; along its banks are parks and drives, and each year it is the scene of a water carnival which attracts thousands of visitors from every part of the state. Canoeing is a favorite pastime. Iron works, including manufactories of gasoline engines and farm implements, large creameries, flour mills, cold storage plants and nurseries represent the chief industries. One mill manufacturing company employs nearly 500 workers, and its annual output amounts to $1,250,000.

Beatrice was named for Julia Beatrice Kinney, an honored pioneer. It was incorporated as a town in 1871, the year its first railway, the Chicago, Burlington & Quincy, was completed to the settlement. In 1873 the town was granted a city charter. In addition to the first road it is now served by the Union Pacific, built in 1881, and the Chicago, Rock Island & Pacific, built in 1889. Beatrice is the seat of the state institution for feeble-minded youth. The buildings and grounds represent an expenditure of $1,000,000. The Gage County courthouse, built in 1890 at a cost of $150,000; the Federal building, erected in 1892 and since enlarged at a total cost of $130,000; the public library; the Y. M. C. A. building, built at a cost of $125,000, and the $100,000 high school building are objects of civic pride. The commission form of government was adopted in 1912. There are three commissioners and a police judge. V.R.J.

BEATRICE PORTINARI, *por te nah' re,* (1266-1290), the poetical idol of Dante, made famous for all time by his *Vita Nuova* (New Life) and *Divine Comedy.* She was the daughter of a wealthy citizen of Florence, and wife of Simone dei Bardi. She was but nine years of age when Dante met her first at the house of her father, and he saw her only once or twice throughout his life, but his love for her dominated his genius. He loved her as saint rather than as woman, however, and in his *Divine Comedy* makes her his guide through the highest heaven. See Dante.

BEAU BRUMMEL. See Brummel, George.

BEAUMARCHAIS, *bo mahr shay',* Pierre Augustin Caron De (1732-1799), a famous French wit, politician and dramatist, whose literary reputation is due mainly to his brilliant and amusing comedies, *The Barber of Seville* and *The Marriage of Figaro.* The popular opera by Rossini, bearing the title of the former, is adapted from Beaumarchais' comedy. He early showed musical ability and was for a time teacher of the harp to the daughters of Louis XV. In 1774 appeared his celebrated *Memoires,* written to uphold his side in a lawsuit. They were greatly enjoyed because of their wit, satire and liveliness. The best of his other writings is a drama entitled *Eugenie.* Beaumarchais had a remarkable liking for notoriety, and, among several other exploits, supplied the Americans with arms and ammunition during the Revolutionary War.

BEAUMONT, *bo' mont,* Tex., the county seat of Jefferson County, in the east-central part of the state, eighty-four miles northeast of Houston. It is on the west bank of the Neches River, and is connected with the Gulf of Mexico, thirty miles distant, by the river and canals. With the completion of the $1,000,000 improvement of this waterway which was under construction in 1916, Beaumont will be accessible to ocean-going vessels. The city is served by the Gulf, Colorado & Santa Fe; Texas & New Orleans; Kansas City Southern; the Beaumont, Sour Lake & Western, and has electric interurban service. The population, which was 9,427 in 1900, increased to 20,640 during the next decade and to 40,422 in 1920, a growth caused by the development of extremely rich oil fields and annexation of territory. The area is about eight square miles.

Among the more prominent public buildings are the Federal building, erected at a cost exceeding $200,000, county courthouse, city hall, Y. M. C. A. building and a Sisters' hospital. Beaumont is one of the principal lumber shipping centers in the South, the annual output, mostly yellow pine, exceeding 360,000,000 feet. Live stock, rice and oil are also important exports. More than $45,000,000 is invested in the development of the oil fields, in refineries, pipe lines and transportation and storage facilities. The city is also in a richly product-

ive rice belt and has some of the largest rice mills in the state. Manufactured products are sawed and planed creosoted lumber (especially shingles), oil-field and saw-mill machinery and supplies, cars, furniture, ice, cottonseed oil, refined oil and petroleum products. Beaumont was settled in 1836, was chartered as a city in 1899, and is ruled by the commission form of government.

BEAUMONT, *bo' mont,* FRANCIS (1584-1616), **AND FLETCHER,** JOHN (1579-1625), two English writers who were prominent figures among the dramatists of the age of Shakespeare. Their names are always associated together because they worked as literary partners. Of the fifty or more plays which they produced, *Philaster* and *The Maid's Tragedy* are known to be largely the work of Beaumont; *The Faithful Shepherdess,* containing much delightful poetry, is attributed to Fletcher. The particular share that each had in most of the plays, however, is difficult to ascertain. Beaumont seems to have been the stronger and more dignified writer of the two, but Fletcher was the superior poet.

Though their plays were fully as popular as Shakespeare's in their own period, they represent the beginning of the decline of the English drama. Character-drawing sinks to a low level in the plays of Beaumont and Fletcher, and the men and women of these writers are so unnatural and overdrawn that they bear no comparison with the lifelike creations of Shakespeare. Further, though their plays are clever and amusing, they are greatly marred by coarseness. To the modern reader they are attractive chiefly by reason of the beautiful lyrics which they contain.

BEAUREGARD, *bo' re gahrd,* PIERRE GUSTAVE TOUTANT (1818-1893), a Confederate general who began the War of Secession by the bombardment of Fort Sumter. He was born in New Orleans, was graduated at West Point, and after distinguishing himself in the Mexican War returned to West Point as its superintendent. In February, 1861, two months after his appointment to that post, he resigned to enter the Confederate army. His operations after the famous attack on Sumter include the winning of the first Battle of Bull Run, the command of the Confederates in the hard-fought Battle of Shiloh and the defense of Charleston against naval attacks by Dupont and Dahlgren. After the war he was president of the New Orleans, Jackson & Mississippi Railroad, adjutant-general of Louisiana, and for some time manager of the state lottery. For accepting this last-named office he was severely blamed, as the lottery was in evil repute and was soon thereafter put out of business by act of the Louisiana legislature.

BEAVER, a fur-bearing animal which is the most famous, interesting and intelligent of gnawing creatures. Its life history reads like that of some modest, industrious race of people, which in spite of, or perhaps because of, its peaceful disposition, has been almost exterminated. At one time beavers were common in the northern regions of both hemispheres, but they are now found in considerable numbers only in the United States and Canada. Even in those countries, although laws exist for their protection, fur-traders are rapidly decreasing the numbers of this master-workman among land-and-water animals. In the early years of American history beavers were so common that their pelts were used in place of money. The term *skin,* used as a standard measurement in fur-trading posts, was based on the size of the pelt of a full-grown, perfect beaver, which, when cured, weighed sixteen to twenty ounces. Traders still use sticks to represent this measurement.

Distinguishing Characteristics. Beavers belong to the same family as muskrats (which see). They are about two feet long, from nose to root of tail, and weigh thirty-five pounds and more. The tail is about ten inches long. It is thick and oval-shaped, flattened horizontally for about half its length. It is naked of hair, but is covered with horny scales. The tail acts as a rudder and an oar when the animal is in a pond or stream, and when slapped on the water it sounds a loud signal to announce the presence of danger. Beavers have small eyes, short ears, blunt noses, small squirrel-like forefeet and large webbed hindfeet. There are two kinds of hair. The upper, which is long, coarse and glossy, is removed before the skins are placed on the market. The under hair, that which is commercially valuable, is short, thick, soft and silky. Beavers are generally of a chestnut-brown color, but some are black and others are white. Most interesting of beaver characteristics are the cutting teeth (incisors), two in each jaw. They are large, strong and sharp, and are curved into a semi-circle. The fronts of these teeth are of hard enamel, the backs are softer and easily worn away, so a chisel-like edge is always kept, for the teeth also continue to grow as they are worn away. The cutting teeth are to the beaver what an ax is

to the woodman, for with their aid trees of considerable size are felled.

Life and Habits. The favorite haunts of beavers are forest-bordered rivers, lakes and streams. Though they occasionally live singly, or in pairs, beavers are sociable creatures and usually live in colonies. Their homes are substantial, cleverly-built structures made of branches of trees plastered with mud, grasses and other materials. These dwellings are built in the water, or on the water's edge, and are called *beaver lodges.* Sometimes they are three feet high and seven feet across. The walls are substantial enough to afford protection against the cold of winter as well as against the average beast of prey. There are two rooms, and always two entrances, both leading into the water. The lower room is used for storage of food, the upper one as the living room. The upper chamber is dry, and air is supplied through an opening at the top. This opening, however, is concealed by a mass of sticks which the beaver carefully arranges. If the chosen stream is not very deep, a dam must then be built to form a pond about the home, to insure continuous entrance through water in spite of summer's drought or winter's ice and snow.

Systematically and steadily the work of home-building and the making of dams goes forward. When the home site has been chosen, the entire colony, young and old, busy themselves at felling trees. Deep grooves are gnawed round the trunks of the trees. Chip by chip the wood is ripped out by means of the chisel-like teeth. The work goes on until at last with a tremble, then a lurch, the tree crashes to the ground. Then again must the gnawing go on. Branches and twigs are removed, the trunks are cut into the desired lengths and the logs are then dragged to the water. Logs, stones, twigs and earth are then cunningly fashioned into a substantial dam—straight across if the stream flows gently, but in a curve facing up-stream if the stream is rapid, so the structure will withstand the current. Both lodge and dam are masterpieces of animal-skill. Some authorities claim that beavers are so intelligent that they always fell their trees to fall toward the water, so they will not have to drag them far. It is not uncommon to find trees two feet in diameter which have been cut down by beavers.

THE BUSY BEAVER

When the homes have been made and carefully protected, the beavers spend a care-free summer living on twigs and bark and roots of water plants. With the approach of autumn, once again they busy themselves repairing their dams, if necessary, and gathering their winter store of willow, poplar, birch and alder bark. For, winter-long, when the pond is frozen over, they cannot go to the land and must live only on their store and on roots which they dig from the water. The breeding season of beavers commences in spring—in April or May. Two to four young ones appear at a birth, and they remain with their parents two years. In the third year they venture forth, mate and start new generations and new colonies.

Among animals, beavers hold the same position that the bees and ants have among insects, in their remarkable instinct of working in

Outline and Questions on the Beaver

I. Characteristics

(1) Of muskrat family
(2) Size, weight, shape and color
(3) Tail
(4) Appearance of head
(5) Fur
(6) Teeth

II. Life and Habits

(1) Haunts
(2) Social nature
(3) Lodges and dams
  (a) Materials
  (b) Method of construction
(4) Food
(5) Industry and intelligence

III. Commercial Value

(1) Fur
  (a) Danger of extermination of beaver
  (b) Importance of fur-hunting in history
(2) Use as food among Indians
(3) Use in manufacture of perfume

Questions

Of what use is the tail of the beaver?

How does a beaver cut down a tree?

What part did this animal play in the early history of North America?

What famous American author wrote a description of its life and habits?

To what curious use was the skin formerly put?

Why does the beaver build a dam?

With what insects may it be compared, and why?

What parts of the beaver besides the skin are useful?

How are the teeth specially fitted for the work they must do?

How old is the young animal when it sets up housekeeping?

Why are beavers not usually shot?

How does the skin of the live animal differ from that seen in a beaver muff?

How large is the ordinary house or lodge?

How many rooms has it? How many openings?

What special adaptation is to be seen in the direction in which a dam is built?

How would you go about it to catch a beaver?

common; and to say that a person is "as busy as a beaver" is as much a compliment as it is to say one is "as busy as a bee." Even though the beaver may live in a cage, its community instincts are demonstrated. It will cut to pieces a box or a chair and build a dam for the stream that will never flow, or weave sticks between the bars of its cage. The animals become used to confinement and colonies are flourishing in zoological gardens in various American and European cities.

Commercial Uses. The thick, warm under coat of beavers is one of the most valuable of furs. It was at one time extensively used in the manufacture of hats, and the early prosperity of New York and Canada was based on beavers. The animals have been driven so far into the wilderness, however, and are so nearly extinct, that beaver fur has become expensive and rare. It is now used chiefly for muffs, collars and trimming, but is necessarily less used year by year.

One form of beaver trap is a noose fastened to a branch of a tree, so arranged that when a beaver's head is caught in the loop, the branch springs up, the rope tightens and so the animal is caught. As beavers go about chiefly at night, it is not easy to catch them by shooting. In 1910 almost 25,000 beavers were killed in Canada, valued at about $132,000, or $5.25 a skin, before the expensive process of dressing.

Indians and frontiersmen liked the flesh of beavers. A reddish-brown substance called *castoreum* is obtained from these animals; it has a strong, penetrating odor and is used by perfumers. At one time it was valued for medicinal purposes.

A very fine description of the beaver, its method of living, also the method of trapping it, may be found in *Astoria,* written by Washington Irving. M.S.

Consult Mills's *In Beaver World;* Morgan's *American Beavers.*

BEAVER FALLS, Pa., is in Beaver County, in the western part of the state. It is thirty-two miles northwest of Pittsburgh, is on the Beaver River and on the Pennsylvania and the Pittsburgh & Lake Erie railroads, and has electric interurban service. A bridge across the river connects the city with New Brighton. The population, which in 1910 was 12,191, was 12,802 in 1920.

Beaver Falls occupies an area of about two square miles, and is surrounded by hills. The vicinity is rich in natural gas and coal. Manufactured products include steel, files, wire, nails,

bridges, automobile accessories, enamel signs, chemicals, glass, clay products, axes, shovels, tubing and gas engines.

Settled in 1801 and first called Brighton, Beaver Falls was chartered as a borough in 1868. The commission form of government was adopted in 1913. The city has a Carnegie Library and Providence Hospital. In College Hill borough, one mile north, is Geneva College (Reformed Presbyterian).

BEBEL, *bay' bel,* Ferdinand August (1840-1913), after Karl Marx, the greatest of German Socialists, the man who made the Social Democrats a great political party in Germany. His extraordinary eloquence, both with tongue and pen, made him even as a young man a leader among the working classes. He was at first opposed to Socialism, but under the influence of Marx and Liebknecht became a convert. In 1867 he was chosen chairman of the permanent committee of the German workingmen's unions, and two years later he was one of the organizers of the Social-Democratic party.

Meanwhile he had been elected to the North German Diet, and in 1871 was chosen to the Imperial Reichstag. He was repeatedly re-elected, and with the exception of two years was a member until his death. He was the first Socialist elected to the Reichstag and for a time was the only Socialist member. Although the rules of the party do not recognize a leader, Bebel was for years its unquestioned chief. A man of great moral courage, he never hesitated to express his opinions freely and forcibly. Three years of his life were spent in prison because some of these opinions were held by the courts to constitute *lèse majesté* and intended treason. He contributed numerous articles to *Vorwärts,* the Berlin organ of the Socialists, and wrote a variety of books and pamphlets on political and economic subjects. His reminiscences have been translated into English under the title *My Life.*

BECK, Sir Adam (1857-), a Canadian manufacturer and legislator, best known for his efforts to secure the conservation and development of hydro-electric power in Ontario. He was born at Baden, Ont., and attended school there and at Galt. After a successful career as a manufacturer he became interested in political affairs. He was elected mayor of London, Ont., for the term beginning in 1902, and also in the same year was elected to the Ontario legislature, of which he was still a member in 1916. From 1905 to 1916 he was a minister without portfolio in the provincial Cabinet, first under the leadership of Sir James P. Whitney and later of W. H. Hearst. In the legislature in 1906 Beck introduced legislation creating the Ontario hydro-electric power commission, of which he became chairman.

BECKET, Thomas a. (about 1118-1170), archbishop of Canterbury, famous for the manner of his death and its effects on English history, no less than for the achievements of his life. He was born in London, educated at Oxford and Paris and studied civil law at Bologna in Italy. Returning, he held various offices in the Church before his appointment by Henry II in 1155 as chancellor of England. At this time Becket lived in a luxurious manner, was a liberal entertainer and the king's favorite companion, but after he was consecrated archbishop in 1162 he gave up his luxurious habits and became a zealous champion of the Church, liberal only in charities.

A series of bitter conflicts with the king followed, ending in Becket's flight to France, but a reconciliation took place in 1170, and Becket returned to England, resumed his office and renewed his defiance of the royal authority. At length the king, irritated at some new defiance, exclaimed in the hearing of his knights, "Have I not about me one man of spirit enough to rid me of a single insolent prelate?" Four of his barons, taking this as their commission, went to Canterbury and murdered the archbishop while he was at vespers in the cathedral, December 29, 1170. He was canonized in 1172, and the splendid shrine erected at Canterbury for his remains was a favorite place of pilgrimage. Chaucer's *Canterbury Tales* are told by a number of people going on a pilgrimage to this shrine.

BECKY SHARP, the chief character in Thackeray's *Vanity Fair,* one of the most convincing, clearly-portrayed adventuresses in all fiction. As the personification of intellect without heart, she is set over against Amelia Sedley, the other heroine of this "novel without a hero," who represents heart without intellect. Becky is not beautiful, but she is so clever and so unscrupulous that few can escape her net. Having married Rawdon Crawley, whom she does not love, merely because she wants an assured position in the world, she risks and loses that position and her own reputation in her efforts to entangle the wealthy Marquis of Steyne. At the close of the long story she is left alone, practically

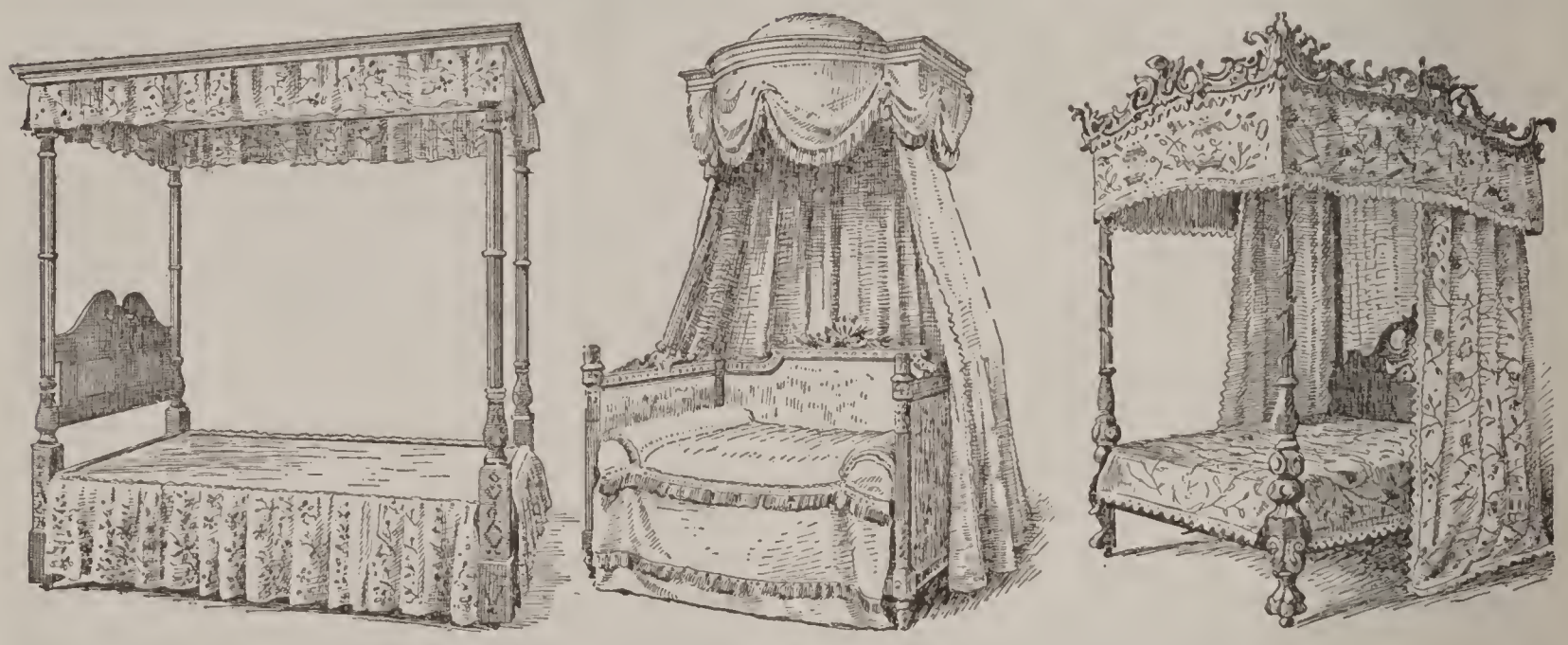
penniless, but she has not changed her methods and the reader feels that she will find no difficulty in snaring another dupe.

BED, in a general sense, the place where one sleeps. Thus the term may include the heap of leaves or animal skin on which the savage lies, the fur bag that serves as a bed for the Eskimo, or the rug or mattress used by the Oriental. The Japanese goes to rest on a strip of matting with a wooden head rest which closely fits the neck. Much more elaborate are the beds of Europeans, Canadians and Americans, who demand the comforts of springs, mattress, linen sheets, pillows and quilts or comforters, all of these being placed on a frame known as the bedstead.

These bedsteads are made of wood, brass and iron, the brass and iron beds having become popular in recent years because they are considered more sanitary than others. Iron beds are enameled in white or colors, and when made to harmonize with the decorations of the bed chamber are exceedingly attractive. However, beds of the choicer varieties of wood, such as mahogany, bird's-eye maple or Circassian walnut, are in high favor.

The desire to save space has also had an important part to play in changing the styles of beds. The old-fashioned folding bed, which resembles a wardrobe when folded up, has numerous modern successors in pieces of furniture that are slept in at night and become in the daytime library tables, bookcases, chests, etc. The sanitary couch and davenport lounge are also popular, as they can be used in the daytime as an ordinary couch. Probably the most remarkable bed that owes its origin to the desire to save space is the so-called *disappearing bed,* which slides into a recess in the wall and is kept there when not in use. Some apartments provided with disappearing beds have no separate bed chambers whatever.

The Beds of the Ancients. Among the ancient Orientals there was slight difference between the bed and the couch on which they reclined during the day. The Babylonians and Assyrian monarchs rested on magnificent beds of ivory, gold and choice woods, and in the writings of the Greek historian Herodotus, the "Father of history," mention is made of Persian beds adorned with gold and silver and covered with rare and costly fabrics. That the Israelitish king likewise had luxurious tastes in this respect is indicated by a passage in *Proverbs* VII, 16: "I have decked my bed with coverings of tapestry, with carved works, with fine linen of Egypt."



DREAMS WERE NO SWEETER BECAUSE OF THESE

At left: bed in home of well-to-do American in the Revolutionary period. In center: French carved and gilt bedstead, period of Louis XVI. At right: a Chippendale bed (see CHIPPENDALE).

The Grecian love of the artistic is reflected in the construction of their bedsteads, the posts of which were usually graceful in design and crowned with the Ionic capital (see CAPITAL). These bedsteads were narrow and only the headboard was raised above the bed. They were generally of wood, but sometimes marble or terra cotta was used. Excavations in the ruins of Pompeii, destroyed by the eruption of Mount Vesuvius in A. D. 79, show that the Romans slept upon a bed much like the modern wooden bedstead in structure and proportions. Bedsteads of bronze, silver and gold have been taken from the ruins; a large number of those excavated are adorned with precious woods, ivory, tortoise-shell, gold and silver. Some of the frames were so high they

could be reached only by means of footstools. The rich used a mattress stuffed with wool or feathers; the poor had to be content with straw or dried reeds.

Medieval and Later European Beds. After the fall of the Western Roman Empire a certain degree of simplicity prevailed in the house furnishings of the Europeans, but the Crusaders brought back with them from Asia Minor some of the luxurious tastes of the East, and in the twelfth century beds ornamented with carvings and paintings were introduced, which had richly embroidered coverings, with canopies overhead. The beds of the French kings of the fifteenth century were famous for their size and richness, and it became customary to hold royal receptions in bed. In the sixteenth century the French royal bed attained a splendor never before equaled, and the superb collection of Louis XIV, consisting of 413 bedsteads of all forms, was the wonder of all who saw it.

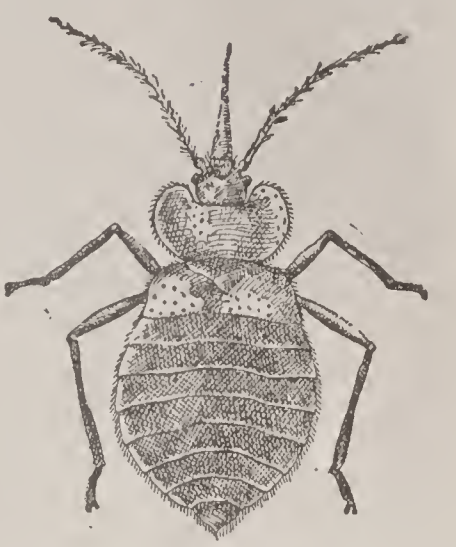
In the sixteenth century the historic "four-poster," commonly used in America in colonial days, was invented. This is a bed with four posts, one at each corner, which support an overhead canopy. The "four-poster" has recently come into favor again in America, without the use of the canopy. Oak became popular in England during the Elizabethan period as a bedroom wood; walnut was in vogue at about the same time in Italy and France. B.M.W.

BED, a term used in geology with reference to any layer in a mass of stratified rock. It may consist of a number of thin layers, or *laminae,* or of a single stratum having considerable thickness. Several strata taken together are usually termed a *formation.* A very thin bed is called a *seam.*

In *mechanics,* a bed is the foundation upon which a body rests. An example of this is the bed-sill upon which a stationary engine is fastened; also the lower mill stone in a grist mill.

BEDBUG, a small, flat, wingless, reddish-brown insect about three-sixteenths of an inch long, that hides in the daytime and comes out at night for food. The female lays her eggs in summer in the crevices of bedsteads, furniture and the walls of a room. The younger insects are small, almost white and semitransparent, and grow to full size in about eleven weeks. The bedbug is fond of human blood, but thrives on other substances, and is often found on swallows, pigeons and doves. When touched it emits an unpleasant odor.

The cockroach is the natural enemy of the bedbug, and it destroys them in great numbers. In Europe one species of small black ant will clear a house of bedbugs in a short time. Houses may be cleared of them by fumigating with brimstone, or painting cracks and other places where they are secreted with corrosive sublimate dissolved in wood alcohol.



BEDBUG
Enlarged about eight times.

The occasional presence of bedbugs in a house is not necessarily an evidence of careless housekeeping. They may enter a home in many ways—on clothing, by way of steam pipes from adjoining apartments, in trunks or boxes from other dwellings, etc. Unless one lives in a large tenement building, however, where many of the neighbors are slovenly, there is no necessity of suffering long from the pests.

BEDE, *beed,* or **BAEDA,** *be′ da,* (about 672-735), known as *The Venerable Bede,* the greatest scholar of Saxon England and the "Father of English History." He was educated at Saint Peter's monastery, Wearmouth; took deacon's orders in his nineteenth year at Saint Paul's monastery, Jarrow, and was ordained priest at the age of thirty. His *Ecclesiastical History of England* is the source of nearly all our information on English history up to the year 731, and was translated into Anglo-Saxon by Alfred the Great. The great body of his writings, consisting of thirty-seven titles, includes lives of the saints, hymns, works on grammar and history, and comments on the Bible. He died while engaged in dictating a translation of the *Gospel of Saint John.*

BEDFORD, Ind., locally known as The Stone City, on account of its extensive stone industry. It is the county seat of Lawrence County, eighty-nine miles southwest of Indianapolis, seventy-six miles northwest of Louisville and 225 miles southeast of Chicago. The city is served by the Baltimore & Ohio Southwestern; the Chicago, Terre Haute & Southeastern, and the Chicago, Indianapolis & Louisville, known as the Monon Railroad. In 1825 the first settlement was made; the city was incorporated in 1889 and was named for the city of Bedford, Pa. In 1920 the popula-

tion was 9,076, an increase of 360 since 1910. The area is less than two square miles.

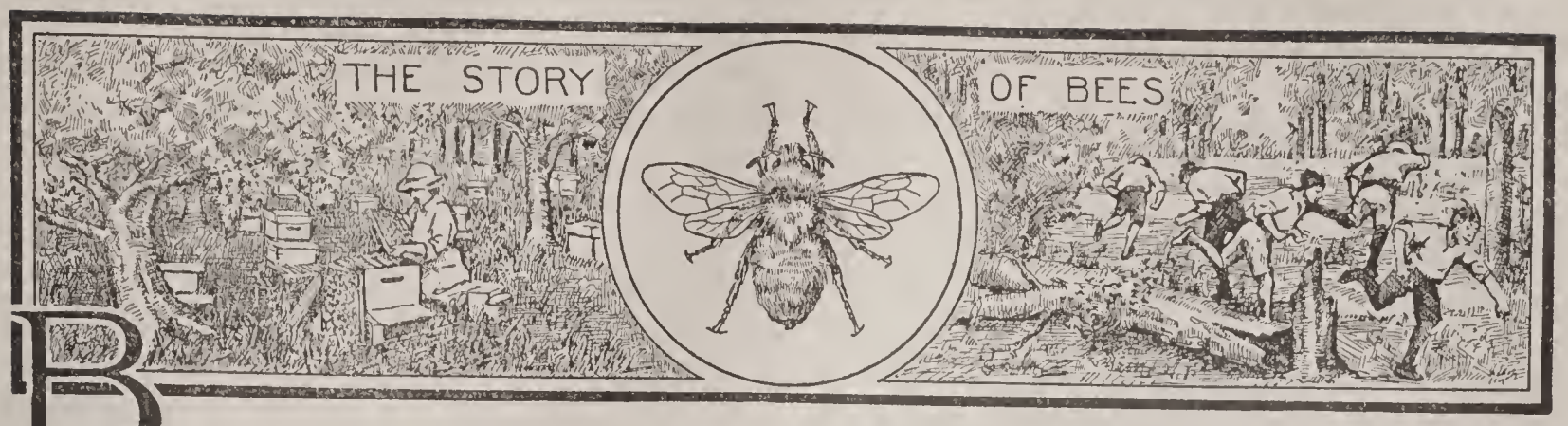
In the vicinity of Bedford there are more than twenty quarries of fine oölitic limestone, commonly called "Bedford stone," and large quantities of it are shipped over a wide territory. This stone was used in the construction of the state capitols of Indiana, Georgia, Kentucky and Mississippi. Besides the stone industry, which employs about 2,500 people and has an annual output valued at $5,000,000, the city has cement works, machine shops and foundries. The repair shops of the Southern Indiana Railroad are located here. For its size the city has unusually fine buildings, the public buildings, schools and churches being built of the local stone. Bedford has a Federal building, a Carnegie Library, Bedford College and an academy. W.G.B.

BEDLAM, a word used in modern speech in the sense of wild uproar or confusion. It has an interesting derivation, being a corrupted form for *Bethlehem,* a name formerly applied to an old hospital for lunatics, in Southwark, London. The full name of this institution is Hospital of Saint Mary of Bethlehem. In olden days the patients of this hospital were exhibited like so many wild beasts, the public paying so much each to see them, and the less violent inmates were compelled to wander about the streets as beggars. The present hospital is a modern institution.

BEDLOE'S ISLAND, an island in New York Bay, on which stands the famous *Statue of Liberty* (see LIBERTY, STATUE OF). Bedloe's, named for a former owner, covers thirteen and one-half acres and lies one and one-half miles southwest of the Battery. It belongs to the United States government and was formerly occupied by Fort Wood. The Liberty statue was erected on the site of this fort.

BEDOUINS, *bed' oo inz,* the name for *people of the tent,* are Mohammedans of the Arab race, inhabiting chiefly the deserts of Arabia, Syria, Egypt and North Africa. Patient and enduring, they lead a wandering existence, associating in families under "elders," or "sheiks," or in tribes under "emirs." They are regularly shepherds, herdsmen and horse-breeders, but because of prolonged summer droughts, they raid on one another for self-support, and plunder unprotected travelers, whom they consider trespassers. They are ignorant of writing and books, so trust to memory or imagination, which latter finds play in their song and story. They are undersized, and though active, are not strong, living chiefly on rice, vegetables, honey, locusts or even lizards at times. The ordinary dress of the men is a long shirt, girt at the loins, a black or red and yellow turban for the head, and sandals. The women wear loose trousers, a long shirt and a large dark-blue shawl covering the head and figure. See ARABIA.

A BEDOUIN ENCAMPMENT



BEE. Almost anyone hearing the word *bee* thinks instantly of just two species—the honeybee, Isaac Watts' "little busy bee" that "improves each shining hour," or Emerson's "burly, dozing bumblebee," the "animated torrid zone." For these two are most commonly seen and heard in the gardens and cloverfields of summer, and it is the former that supplies man with one of his most popular luxuries. But these two species make up a very small part of the great group of insects known as bees—a group which ranks as the highest of the insects (unless the ants are thus considered) and is as interesting as any of the forms of higher life. Authorities declare that there are about 5,000 species of bees, some of them small and insignificant, some so like flies or wasps that they are almost unrecognizable; but all possessed of an intelligence, an ingenuity that seems incredible in such small creatures. Most of these kinds of bees live a solitary and not a social communal life like that of the honeybee and bumblebees. Much that is told of bees sounds like the merest "nature-faking," but it has back of it real knowledge, based on generations of study. Care must always be taken, however, as in the study of any form of animal life, not to impute the motives and reasoning powers of human beings to these creatures of lower order. Much that seems like the result of calculated intelligence is in reality inherited and unreasoning instinct.

Distinguishing Characteristics. With the ants and wasps, bees belong to the great order of membrane-winged insects, known to scientists as the *Hymenoptera.* Each member of this order—unless it be of the wingless species like some ants—has four wings, and a bee may be by this fact infallibly distinguished from any of the two-winged, bee-mimicking flies. Bees themselves differ from all other membrane-wings by having feathery hairs on the head and thorax, thickened hind feet, and mouth parts so modified that nectar may be gathered from the flowers. It is this characteristic which has given rise to the division of all bees into two groups—the short-tongued bees, which can find their food only in the shallow, open flowers, and the long-tongued bees, which can penetrate to the bottom of the deepest tubular blossoms. There are also other interesting adaptations of organs to special use. In some bees, which burrow into the ground or into wood, the jaws have grown into sharp, digging tools, while in others the jaws form a sort of spoon wherewith wax may be moulded.

The eyes of bees are large and compound—that is, made up of hundreds and hundreds of little eyes; and it is probable that no insect has better sight. The wonderful ability to return to the home spot from a far-distant place, exercised so unswervingly that "a bee line" has become proverbial for the shortest distance between two points, seems to depend not so much on a sense of direction, as in birds, but on a keen sense of sight. It seems possible that bees can distinguish colors, too, as they seem to show a preference for certain colored flowers. Their antennae, which they use as "feelers" and as a means of communicating with each other, are probably their organ of smell as well, but just where their "ears" or hearing organs are located cannot be determined. That they can hear seems certain, however.

What Bees Eat. A bee will feed upon moistened sugar if it can get nothing else, but it far prefers the dainty, perfumed nectar of flowers, certain bees showing an especial liking for certain flowers. And when bees want the honey from flowers they are very determined in their efforts to get it. If a flower is too narrow to allow them entrance they use their strong cutting jaws to open a way for themselves. Nor is honey the only thing bees take from flowers. The young, which are not little bees, but tiny grubs, or *larvae,* are not fed on honey but on "bee bread," which is but the pollen the flower-visiting bees carry home on their thighs. This they roll into a compact

little mass and press down into the cells where the young are.

For all that the flowers do for them the bees pay well by one very important service which they perform. Many a flower would never come to maturity—never yield seed from which its kind may be reproduced—did not the bees visit it. As it pushes down into the blossom to find the nectar always hidden in the deepest corner, the bee brushes off on its hairy legs the pollen, that insignificant, red or brown or yellow dust which is more important than all the gaily colored petals; and on entering another flower it shakes off a part of this on the pistil, thus fertilizing the flower (see CROSS-FERTILIZATION). Now if the bee buzzed into all flowers helter-skelter, just as they come—a rose, a four-o'clock, a nasturtium—it could not fulfill this important mission, for a rose cannot be fertilized with pollen from a pansy nor a lily with that from a morning-glory. But a bee is a systematic worker, visiting in succession all the flowers of one kind which it can find before it passes on to another.

Very wonderful indeed is the study of flowers in their relation to bees and other insects, bringing as it does the realization that not only the nectar but the beautifully-shaped and tinted petals have been developed just to attract the pollen-carriers. Certain flowers, as the snap-dragon, cannot be fertilized by flies, and are therefore so made that a fly cannot enter them and steal their honey without doing them any service. The curiously-shaped petals are closed until the heavy bumblebee alights on the ledge or "lip," when its weight opens up the blossom and lets it slip in.

Kinds of Bees. The commonest and most serviceable classification of bees is not made along structural lines, but according to their methods of life, and with this as a test they are divided into two groups—the *solitary* bees and the *social* bees. In the former class, each family lives by itself, and does its own work, and though often several families build their homes or nests close together, there is no community life or specialization in the labor. In these solitary bee families there are, as in most other insects and all higher forms of life, but two kinds of individuals—male and female. Best known and most interesting of the solitary families are the carpenter-bees, large and small, and the mason bees. See *Carpenter-Bee; Mason Bee,* in subtitle below.

The social bees, which stand at the very summit of bee life and often appear to have real intelligence and not mere instinct, live in communities governed by strict laws and conducted with the greatest orderliness. Social bees alone have the power of secreting wax, the solitary bees making their nests by boring into the ground or into wood and walling off cells with mud or cut-up leaves. Of the social bees there are but two families, the bumblebee and the honeybee, each of which is fully described below.

The Honeybee

This is the only insect which makes any contribution to the food of man. It is the most highly developed and intelligent of the insects, and none other except the ant can compare with it in its wonderful community life. The ant does have, apparently, all the rules and regulations necessary to maintain a well-ordered social life, but it does not build so elaborate a home or store its food so systematically.

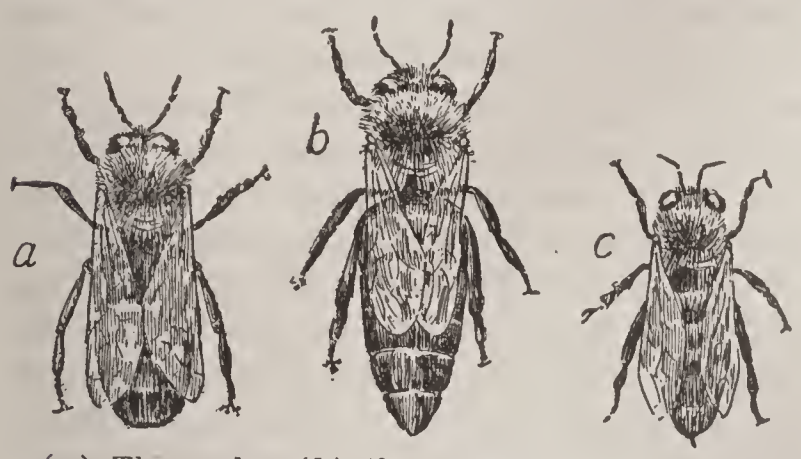
The well-known hive-bee is not native to North America, but was brought from Europe by the early colonists and has made itself perfectly at home. In the eastern hemisphere it has been known and appreciated for thousands of years. The eighteenth chapter of the book of *Judges* tells of the finding by Samson of a "swarm of bees and honey in the carcass of a lion," and of the fantastic riddle which he evolved out of the circumstance; and the classic literature of Greece and Rome has numerous references to honey. In those early days sugar was unknown, and the honey furnished by the half-domesticated bees took its place. What its importance was among ancient peoples may be seen from the frequent use of the expression, "a land flowing with milk and honey," to describe a fertile and attractive country.

But if bees are not native to America, and were brought thither, in a domesticated state, how are the wild honeybees, which fasten their combs to overhanging rocks and to limbs of trees, to be accounted for? These, it has been determined positively, are not native species which have never been domesticated, but "reverted" swarms, descendants from some which escaped long ago from their man-made hives.

For physical features and modes of life

which are common to all bees, see the beginning of this article; also, *Bumblebee* and *Solitary Bees,* including *Carpenter-Bee* and *Mason Bee,* following this section.

Forms of Honeybees. The honeybees, like the bumblebees, which with them make up the so-called social group as distinguished from the solitary bees, consist not merely of males and females. They include a third form as



(*a*) The male; (*b*) the queen; (*c*) the worker, or neuter.

well, known as *neuters,* or workers, and it is not possible to say that any one of the three is most important. Most numerous and smallest are the workers, which are but undeveloped females. These little creatures, about half an inch in length, have some of the most curious modifications of structures to fit them for their work which are to be found in all the insect world. For one thing, each worker has a curious honey-bag which corresponds to a bird's crop, in which the nectar is stored from the time it is taken from the flower until the bee reaches the hive. There it is forced out, and placed in the cells or "combs," but in the meantime something has happened to change its flavor, for honey has a distinctive taste, different from that of the flower nectar. Just what it is that the bees do to their burden of nectar to give it the exquisite honey flavor, no one has ever been able to find out. The worker has on its hind legs pollen baskets, into which it thrusts the pollen stolen from the blossoms; it then transports it to the hive. Another remarkable feature consists of the glands for the secretion of wax and the wax plates on which it is spread out and hardened. The worker has a straight needle-like sting.

The males are larger than the workers, and their bodies are more hairy. Their eyes are many times as large, and their wings are much stronger, but they have none of the special structures by which the workers are fitted for their tasks, for the males do not work. Because of the characteristic deep buzzing sound which they make as they fly they are commonly known as drones, and this has come to be a term of reproach applied to any one who is not willing to do his share of work in the world.

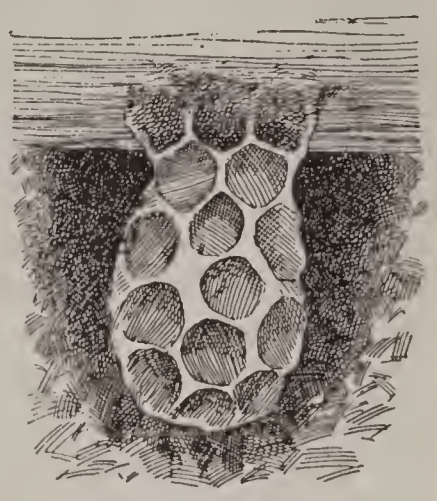
Longer than the workers or the males, but slimmer than the latter, is the perfect female, or *queen.* This royal name applied to her is likely to give rise to the idea that the queen is the ruler of the bees, but such is not the case. She is the egg-laying female, and because the swarms could not increase without her she is carefully looked after by the workers, but she has no special privileges, nor is one permitted to live in the hive when she is not needed. Since each hive needs but one queen, a second one that develops must either find her way elsewhere, be stung to death by the old queen, or be suffocated by the workers. The queens, like the males, have no pollen baskets or wax pockets, but unlike the males, they have stings, which are curved and not straight like those of the workers. Since the queen does not wander from the hive, it is not her sting but that of the worker with which many a stroller in country places has been made unpleasantly familiar.

The queen, it is believed by some authorities, never uses her sting except against a rival queen in the same hive, but the workers protect themselves and the honey stores which they are carrying home against other insects and against birds. The wound is very painful, owing in part to the backward-pointing stiff hairs on the sting, in part to the poison which is injected, and a sufficiently great number of bees can actually sting to death a large animal. Kipling in his *Jungle Book* tells how the united efforts of the "bee people" turned back the dingoes, or wild dogs, which were sweeping over the jungle.

Life in the Hive. Honeybees live in large colonies or societies, known as *swarms,* which consist of from 10,000 to 60,000 individuals. In all this number there is but one full-grown queen, and the males may number several hundred, but with the coming on of the winter season these are all stung to death by the workers, who make up the great mass of the swarm.

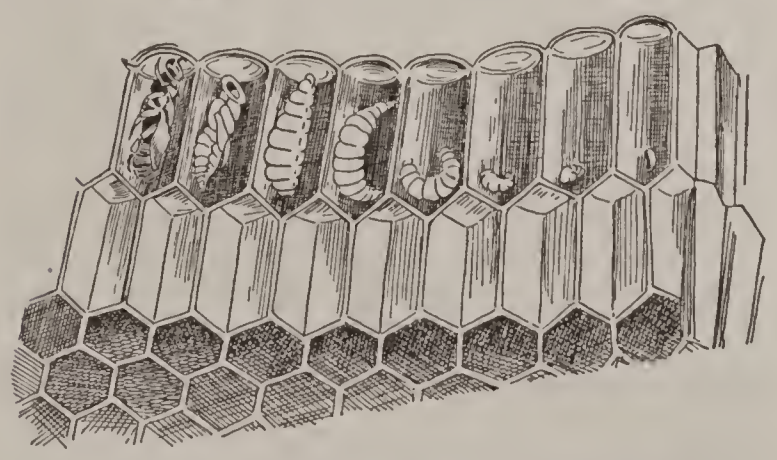
Construction of Comb. Well-ordered, indeed, is the life of the community. No bee ever tries to assume the rights and duties of another; no bee, apparently, ever tries to escape its own duties. Just what part each has to play may be best seen by a survey of the activities of a swarm which has just found its home in

a new hive. It is a clean, empty place, containing nothing but wooden frames on which comb may be built. And this comb is the very first requisite in the new home. Accordingly, a group of workers, or several groups, if the swarm be large, withdraw to a corner and form a hanging cluster, each bee holding to those above it by its hooklike feet. At once they begin to secrete a liquid wax, which hardens in scales on the wax-plates of their abdomens and is carried off by other workers to be built into six-sided cells. Nothing about the work of bees is more wonderful than the shaping of these cells. Mathematicians declare that the greatest ingenuity could not work out a method of placing and shaping these which would more effectually combine economy of space and material with the necessary strength.



BEGINNING OF THE COMB

Egg-Laying. When a number of cells have been made, the queen begins to lay eggs, and her method is most systematic. From cell to cell she goes, pokes in her head to make sure that a cell is empty and ready, and then glues an egg fast to the bottom. Not every cell is filled, for some are needed for the storing of honey and pollen. One unfailing instinct the queen possesses. There are two sorts of cells, the regular-sized ones for the eggs which



DEVELOPMENT OF A HONEYBEE

are to hatch into workers, and the larger cells for those which are to develop drones, and never does the queen mistake and drop the wrong egg into a cell.

The life of a queen is generally three or four years, and all during that time she is laying eggs, for she is the mother of every bee in the hive, and as the other classes do not live as long as she does, there must be a constant supply of young bees coming out to take the place of the failing ones. Drones live through a whole season, but the tireless workers last only about six weeks. When they weaken and drop no sympathy is shown them, but they are hustled out of the hive and left to die, for the bees are perfect communists and consider no individual as anything. But the queen, while she must labor hard to keep up the population of her colony, is too wise to produce workers always at the same rate. In the summer when honey is plentiful and many are needed to care for it, she works very fast, laying sometimes as many as 3,000 eggs in a day, but in winter, when the food supply is running low, she produces comparatively few. All the time that she is journeying about the hive depositing her eggs, she is accompanied by eight or ten workers, her "ladies in waiting," who surround her in a circle, each one with its head toward her. Evidently hive etiquette, like that of a court, does not permit the turning of one's back toward the queen. Some authorities hold that it is not the queen who is so wise about laying drone eggs and worker eggs each in their proper cells and about regulating the population, but that her special bodyguard of workers directs all her actions.

Other Industries of the Hive. Bees have been domesticated for so long that close observation of them has been possible, and most of their activities are fairly well known. Nothing, it seems, is neglected in their wonderful community, where no one bee has any more authority than any other, but it seems impossible to discover whether certain companies are delegated to attend to certain duties, or whether all share alike. There is, as stated above, honey comb to make and honey and pollen to gather. "Bee gum," technically known as *propolis,* a sticky substance with which they strengthen cells and patch up holes, must also be brought in, and honey-filled cells must be sealed up. Then, too, the hive must be kept clean, and a number of bees are always active carrying out broken wax, dead bees and refuse of all sorts, while others stand at the door as guards and touch with their antennae, or feelers, every bee which tries to enter, to make certain that it really belongs to the swarm. How they can be certain is not known, but some infallible instinct evidently tells them. Strangest of all, a large squad have as their function the furnishing of the air in the hive. They take their stand

near the entrance, and with rapidly fanning wings keep the air in motion. This not only provides ventilation but evaporates from the flower nectar in the cells a part of its water content and thickens it into honey.

Development and Care of Young. But the most important duty of the workers is the care of the young, for the queen mother pays no attention to them. The oval egg, about one-twelfth of an inch in length, hatches in three days, and at the bottom of the cell there lies a little white grub—the bee in its *larval state.* The wormlike larvae are so helpless that the workers have to force food into their mouths, and the first food that they receive is the special "bee-jelly," a pre-digested substance forced out from the stomachs of the workers. Later they are also given "bee-bread," a mixture of honey and pollen, but after about five days, when each young bee almost fills its cell as it lies curled up in it, they refuse food, and the workers seal up the cell, using not the pure wax with which they cap the honey cells, but a porous mixture of wax and pollen through which the larvae may obtain air.

Within the sealed cell the little larva spins its very fine silky covering and lies dormant for about two weeks; then the young bee, fully developed, gnaws a hole in the cap and crawls out. If the new bee is a male, or drone, it has no tasks to perform, and may, after trying its gauzy wings by short flights, go forth and frolic in the sunshine; but if it is a worker, it speedily learns the meaning of duty. For a time she is a nurse, caring for the undeveloped young; then she learns to make comb, to clean house and to help ventilate. Finally, after she has been a winged creature for about a week, she makes her first flight, and from that time on helps in the honey-gathering.

Developing New Queens. As the swarm grows all the time because of the constantly emerging young bees, it begins to be too small for its quarters, and the wonderful little creatures know well the way out of the difficulty. First, they must develop a new queen, or, since it is not safe to risk disappointment in such an important matter, several new queens. No special eggs are laid for this purpose, but a special cell must be provided. The walls are torn down between a cell which already contains a worker egg or a very young larva and several surrounding cells, so that one very large one is formed, quite different in appearance from either worker cells or drone cells. When the larva is ready to be fed it is given bee-jelly exclusively, and no bee-bread, and the difference in feeding is what produces, apparently, the queen; for when, seven days after the acorn-shaped cell has been capped, there issues a young bee, it is a slim, graceful queen. After she has learned her way around the hive she starts on a tour of inspection with just one object—to discover other queen cells. If she finds such she breaks them open and stings to death the undeveloped queens within.

Swarming. But there is still the old queen, and rivalry between them is keen. Perhaps they may fight and one or the other of them be killed, and the whole process of queen-

A SWARM ON A TREE BRANCH

development has to be gone through once more; but more commonly the bees *swarm,* as it is technically called. All the hive is in vast excitement. Few workers go forth for

honey or perform their other duties, and a constant buzzing is to be heard. Then on a bright, warm day one of the queens, usually the old one, issues from the hive, followed by a part, sometimes more than half, of the swarm, and after a short flight settles on some object, frequently the limb of a tree. Scouts are sent out to find a new dwelling place, and the bee-keeper may lose his swarm unless he has ready at hand a new hive which they can be induced to enter. Here they set up housekeeping on precisely the same methods as in the old hive.

Meanwhile the new queen, having surveyed her domain, issues for a flight, but the workers know that she will return, and do not follow her. Very high into the clear air she flies, and the males, who are hovering over the fields, see her and follow, but so lofty is her flight that only the strongest can keep up with her. The mating takes place high in the air; the drone dies within a few minutes, and the queen comes back to the hive, never to leave it again except for swarming. As many as three successive swarms may issue from a hive in one season, but a bee-keeper tries to prevent frequent swarming, for new colonies have to spend so much time storing up honey to feed the young that they have little to spare for the gathering of the surplus which makes the bee-keeper's profit.

Wintering. The drones, as stated above, are killed at the approach of winter, that they may not need to be fed on the stored-up honey. Not nearly so many eggs are laid, and all the activities of the hive slacken. But bees do not *hibernate* in the sense of remaining dormant during cold weather, and they must therefore eat, but not nearly so plentifully as during more active seasons. A fairly large bee colony should have at the beginning of the winter from twenty-five to thirty pounds of sealed honey if it is to remain in good condition until spring.

Bee-Keeping. Brought from Europe centuries ago, bee-culture has made great strides in North America, where millions and millions of pounds of honey are sold annually. The large proportion of this is produced in the large *apiaries,* as places for the keeping of bees are called, but many people keep a few hives to provide themselves with a delicious luxury and to have the pleasure of studying the interesting insects. No longer are hives of the old regulation "beehive" shape common; square boxes with removable frames have been found to be far more satisfactory. The lower part of the hive is given up to brood-cells and those in which the bees store honey for their own use, but above is a shallower story, known as the *super,* into which are fitted "section-holders" which hold in place the little square boxes or frames in which comb-honey is placed on the market. Not until the storage cells in the brood-chamber are filled should the bees be allowed to begin storing honey in the section-boxes. In each of these little squares, at the center of the top as it stands on edge, is placed a small piece of comb as a foundation or suggestion to the bees as to where to start.

The raising of bees for commercial purposes is not a simple matter of placing a hive in a suitable place and a swarm of bees within it. The bee-keeper must learn innumerable things about the habits of the little creatures and the method of handling them. He must know how to prevent the development of queens and the resultant swarming at wrong seasons; how to induce his bees at just the right time to begin storing in the supers, how to protect them from enemies (see below), and from the winter cold. Numerous books have been written to teach the principles of bee-keeping, and an attractive one of the smaller, less technical sort is Anna B. Comstock's *How to Keep Bees.* Nothing but really keeping bees, however, can satisfactorily teach. Hives made almost entirely of glass may be procured, and through the transparent sides the interested observer can watch all the motions of the busy little socialists, tracing a bee, from the time it enters the hive, through all its varied activities.

Bee Enemies. In winter, when the bees are torpid, mice sometimes enter the hive and feed upon wax, honey and bees, but the worst enemy is much smaller and more inconspicuous. This is the larva of the wax moth, which does its work in darkness and silence, digging through the cells, wasting the honey and devouring the young, undeveloped bees. Sometimes a whole swarm is ruined by this pest, for as the old bees die out there are none to take their places. There seems to be no way of guarding against these wax moths except by keeping the hives in good repair so that the egg-laying females cannot find their way inside.

But disease is a worse enemy of bees than any animal or insect pest. Two diseases, known as European and American foul brood, affect

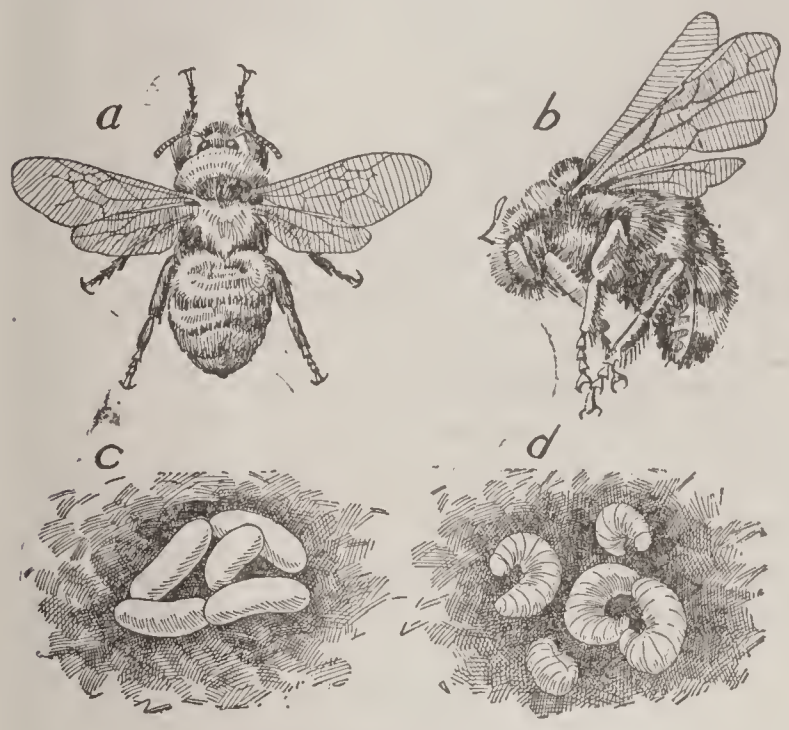
the larvae, and do millions of dollars worth of damage each year. The only safe method of dealing with these diseases consists in removing the bees from the infected hive to a new one, and destroying the infected comb and larvae.

V.L.K.

The Bumblebee or Humblebee

This is the wild bee with the deep, loud *br-r-ruming* hum. It possesses the most painful sting of all the bees. It is well known in most parts of the world, particularly in temperate regions, and in the northern hemisphere it often reaches the Arctic Circle.

What It Looks Like. The bumblebee looks much like the little honeybee, but is much larger and its body is thick and very hairy, often colored in bands. Unlike the honeybee, it has two spines on the hind legs. The female bees are larger than the male. The workers sting severely; being wild, and not cared for as is the honeybee, bumblebees need this weapon of self-defense, for mice and many larger animals destroy their nests, stealing the honey and the brood. Boys, too, delight in honey-plunder, and are often stung for such deeds.



THE BUMBLEBEE

(*a*) The bumblebee, about natural size; (*b*) position when about to alight on a flower; (*c*) eggs; (*d*) larvae.

Where and How It Lives. Under the ground in deserted nests of mice, in hollow trees or in openings in rocks, bumblebees live in small colonies of fifty to 200, where half of the bees are workers, or neuters, the rest females and males. They are not so orderly or perfect in their family life as the honeybees, as may be seen in the roundish, oval, scattered cells of different size found in a single nest. Some of these cells are used more than one year. Bumblebees collect honey and store it in the old cells, and when flowers are plentiful and the stores of honey large, new cells of wax are built. But at the end of the season the males and workers die, and only a few females,

NEST OF THE BUMBLEBEE

He has none of the aristocratic instincts of his relative, the honeybee.

each destined to be a queen, survive. During the winter the queen bee sleeps beneath leaves or moss. In the early spring she awakens and immediately gathers a store of old honey and pollen, in which she lays eight or ten eggs. Continuing to collect food, she lays eggs for one brood after another. As the eggs hatch the larvae (young) eat the surrounding food, and grow rapidly. When fully grown they spin a silken wall about them which the old bees strengthen by a layer of wax, and in these cells the early broods develop into workers. They immediately assist in building cells and gathering honey. Later broods produce females and males, and eggs laid after the last of July produce the large females, or queens.

What Is Its Use? The honey of the bumblebee is strong-flavored and not desirable for commercial use, and the sting of this bee is long remembered; so many think it just as well to kill it. But the bumblebee is useful. It aids in the cross-fertilization of plants, and is the only insect which can fertilize the clover. Bumblebees were taken to Australia and New Zealand especially for that purpose, for without them clover could not be successfully grown in those countries.

The Guest Bumblebee. In the nest of the bumblebee will always be found a cell with

OUTLINE AND QUESTIONS ON BEES

Outline

I. Distinguishing Characteristics

(1) Membrane-winged insect
(2) Feathery hairs on head and thorax
(3) Thickened hind feet
(4) Tongue adapted to gathering nectar
(5) Senses
  (a) Sight
  (b) Touch
  (c) Smell
  (d) Hearing

II. What They Eat

(1) Honey
(2) Bee-bread

III. Cross-Fertilization of Plants

(1) Method
(2) Systematic visiting of flowers
(3) Modifications of flower structure

IV. Classification

(1) Social bees
  (a) Honeybee
    1. Historical
    2. Classes of individuals
      (a) Workers
        1. Largest class
        2. Smallest form
        3. Undeveloped female
        4. Performs all work
      (b) Males
        1. Larger than workers
        2. Hairy body
        3. Performs no tasks
        4. Killed at approach of winter
      (c) Females or queens
        1. Largest body
        2. Lays all eggs
        3. Has sting
    3. Community life
      (a) Wax-secreting
      (b) Comb-building
      (c) Egg-laying
        1. How eggs are placed
        2. Number laid
    4. Development of young
      (a) Egg
        1. Size
        2. Shape
        3. Hatches in three days
      (b) Larva
        1. Grub-like
        2. Fed by worker
      (c) Young bee
    5. Development of queen
      (a) Same egg as worker
      (b) Difference in food
      (c) Hostility to other queens
    6. Swarming
    7. Wintering
    8. Bee-keeping
      (a) Best kind of hive
        1. Brood-cells
        2. Supers
    9. Enemies of bees
      (a) Insect
      (b) Disease
  (b) Bumblebee
    1. Structure
      (a) Size
      (b) Color
      (c) Sting
    2. Community life
      (a) Ready-made nest
      (b) Wax in cells
      (c) Only females live through winter
      (d) Formation of new colony
    3. Fertilization of flowers
    4. Guest bumblebee
(2) Solitary bees
  (a) Carpenter-bee
  (b) Mason bee

Questions

What does the scientific name of the order to which bees belong mean?
How can bees be told from other insects of this order?
Where do bees rank among the insects as to intelligence?
What kind of eyes have bees?
What is their favorite food?
What are the young fed on?
Are bees an injury or a benefit to the flowers they visit?
What system of visiting have they that has its effect on the flowers?

OUTLINE AND QUESTIONS ON BEES—Continued

Into what two great classes are bees divided?

Name the most important solitary bees.

To which class does the honeybee belong? The bumblebee?

What curious difference is there in the number of classes of individuals in the two great groups?

Did the American Indian know anything about honeybees?

What is a neuter?

What is a drone? Why is it given that name?

Which classes of honeybees have stings?

How does the queen compare in size with the workers and drones?

Is she the ruler of the hive?

What is her special function?

How many queens does one swarm have?

Which class of honeybees builds the comb? Which secretes the wax?

How long does a queen bee live? How long does a worker live?

Is there a difference between a worker egg and a drone egg? Between a worker egg and a queen egg?

How many eggs can a queen lay in a day?

How long does it take the eggs to hatch?

How are queens developed?

Why do not the thousands of bees in a hive die for lack of air?

What are the larvae (young) of the honeybees fed on?

How long after the egg is hatched is it before the fully developed bee appears?

Which is most numerous class of honeybees?

Why do bees swarm?

Will they swarm without a queen?

What happens to honeybees in the winter?

What kind of hive is now considered best for honeybees?

How does it happen that some sections of honeycomb are entirely filled with honey, while others have honey alternating with egg cells?

What are the worst enemies of honeybees?

What does a bumblebee look like?

Can a bumblebee sting?

Is it a wild bee or a domesticated bee?

Where does it make its nest?

Can it secrete wax?

Are bumblebee queens as jealous of each other as are honeybee queens?

What happens to bumblebees in the winter?

Is the honey made by bumblebees good to eat?

Why should bumblebees ever be introduced into new territory?

What uninvited guest does the bumblebee have?

Why is the carpenter-bee given its name?

Describe the way it builds its nest.

Can the mason bee make wax?

Of what does it construct its home?

What striking difference is there between the honeybee workers and the ant workers?

Why can it be said that an ant colony is much more permanent than a bee colony?

How do we know that people have been acquainted with honeybees for a very long time?

a very strange guest. It looks like a bumblebee, but it is not one, although a near relative. It lives on the honey gathered by the workers, but does not a single thing to pay for its keeping. It is merely a parasite, or something which lives wholly through the efforts of other living things (see PARASITE). But no quarrels are caused by its presence, and some have thought it to be a degenerate type of the true bumblebee. V.L.K.

"Solitary" Bees

Carpenter-Bee, a solitary bee as large as the largest bumblebee. Each mother carpenter-bee builds her own nest and provides the food for her young. She burrows into wood for a short distance and then makes a tunnel for a foot or more lengthwise of the grain. Beginning at the bottom, the bee lays her eggs, each in a separate cell one above another, and all are filled with a plentiful supply of food. One by one the eggs hatch and the young remain in their cells and wait; when the last one is hatched, the mother leads her

HOME OF THE CARPENTER-BEE

family out for a flight in the sunshine. There are a few kinds of small-sized carpenter-bees.

Mason Bee, a pretty little bee which belongs to the class of "solitaries," or those which live not in communities, but by families. The mason bee either hollows out a tunnel in pithy wood or makes a nest in some convenient ready-made hole, as a snail shell or a little hollow in the rocks; but in any case she earns her name by her method of constructing egg cells. These she makes of moist clay, in which are embedded little stones, sticks and leaves, and she works so skilfully that the inside of the cell is perfectly smooth. In each cell is placed one egg and a store of bee-bread, of honey and pollen, whereon the grub-like young may feed. V.L.K.

Consult Roots' *A B C of Bee Culture;* Cowan's *The Honeybee; Its Natural History, Anatomy and Physiology.*

A Booklet on the Bee

There is nothing in all their school work that children enjoy more than the making of illustrated booklets, and when the subject is such a fascinating one as the bee, the pleasure is increased. The following outline is merely suggestive, but will give a good idea of how attractive a booklet may be made. Use two sheets of paper 9x12 inches, or larger, and fold once, making eight pages:

Cover page—Border at top and bottom of six-sided figures, representing cells.
Title, *The Honeybee,* made of hexagonal drawings.
Design, old-style hive or *skep,* representing industry.
Name of school and pupil's name at bottom.

Page two—(Blank).

Page three—Essay, *The Bee.*
Illustrations: Worker, queen, drone, larva.

Page four—Essay, *The Relation of Bees to Flowers.*
(a) What the flower gives the bee.
(b) What the bee gives the flower.
Illustrations: apple · blossoms, wild rose, clover.

Page five—Copy of short poem on the bee.
Illustrations: Hive; bee on the wing.

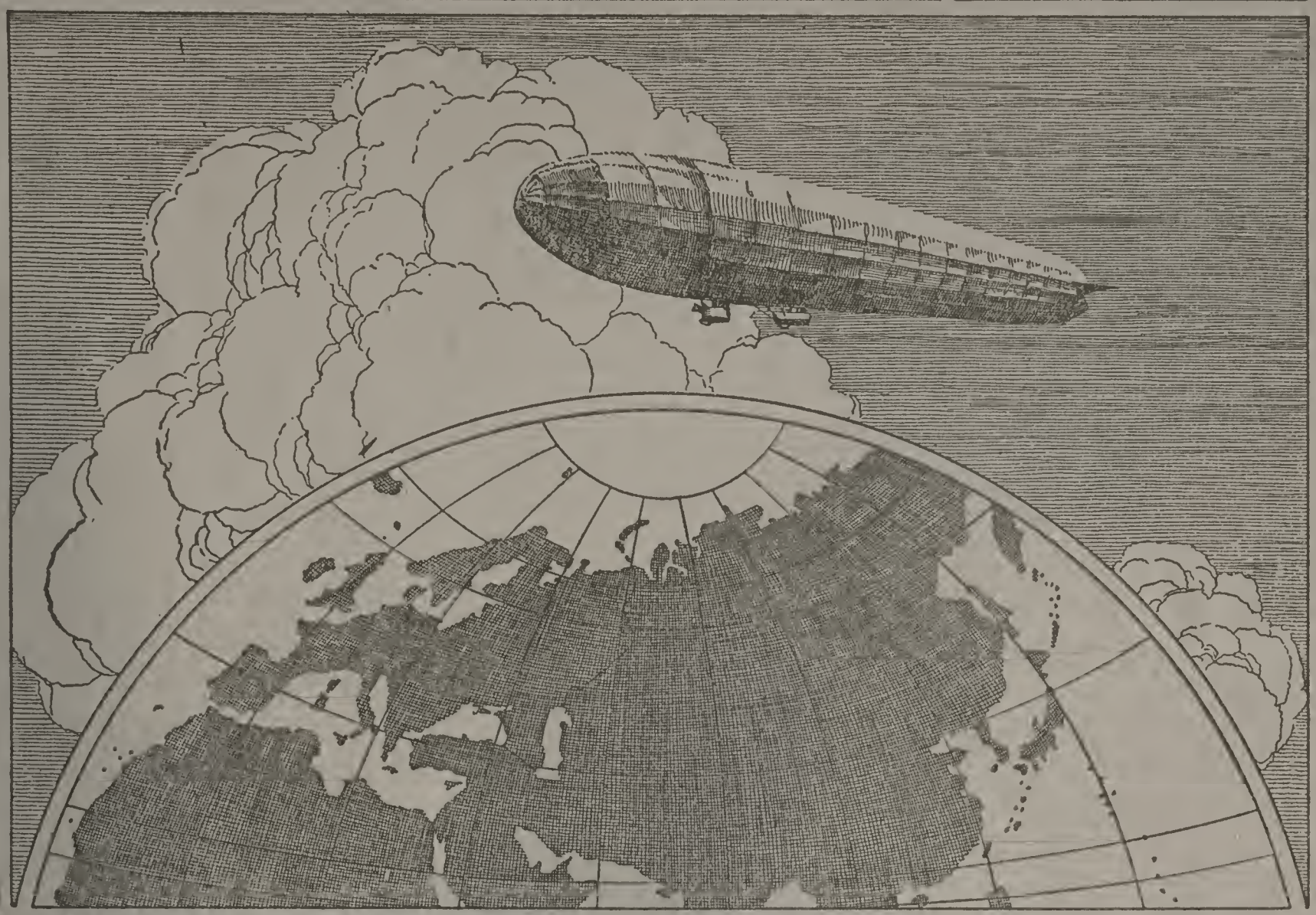
Page six—Essay, *Honey.*
(a) In the comb.
(b) Strained honey.
(c) Commercial value
(d) Food value.
Illustrations: Section of comb, jars of strained honey.

Page seven—An original page to distinguish your booklet.

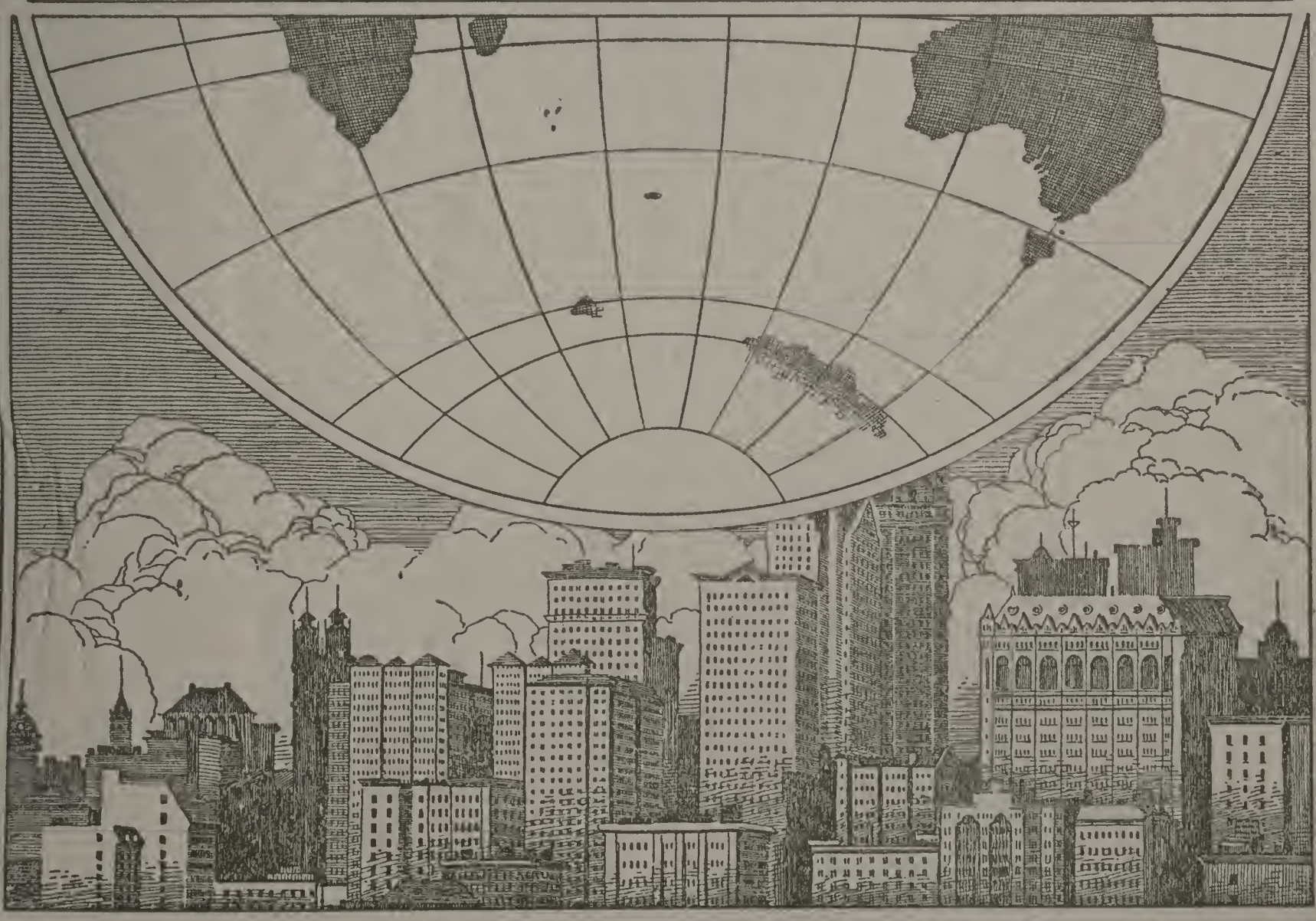
Page eight—Quotations about the bee. Illustrate.

End of Volume One

THE WORLD BOOK



THE WORLD BOOK



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